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THE PATHOLOGY AND ROENTGENOGRAPHIC MANIFESTATIONS OF PNEUMOCONIOSIS

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To the pathologists who coined it, the term pneumoconiosis was useful to describe all pulmonary reactions due to the inhalation of dust. Under the impetus of compensation laws this group of conditions has received so much attention that today pneumoconiosis is almost a household word. But too few are aware of its original significance and even some medical writers use it interchangeably with the specific term silicosis. As a pathologist I prefer to retain the original meaning and use pneumoconiosis as a generic term to describe all forms of pulmonary reactions to inhaled dust, with no implication as to character, severity or effect on function. The two clinically important forms of pneumoconiosis that are known as silicosis and asbestosis are respectively due to inhaled free silica and asbestos dusts. Other forms have been given special names to indicate the kind of mineral that produces them, but such terms have little practical significance because most pure substances other than free silica and asbestos cause little irritation and provoke essentially the same kind of tissue changes. Available information would make it more logical to classify most of the other known pneumoconioses in two general categories. Those which are characterized by appreciable degrees of fibrosis will yield free silica on analysis and hence should be designated as "modified silicosis." For the remainder I would suggest the name "benign nonspecific pneumoconiosis."

Illustrative of the latter are simple anthracosis and siderosis produced by inhaling relatively pure coal or iron dusts. By themselves these minerals provoke no significant fibrosis but merely pigmentation, which has no influence on pulmonary function. When they are mixed with free silica there is a fibrous reaction, but it is due to the contaminating silica. The resultant diseases are then more properly designated as anthracosilicosis and siderosilicosis.

Badham [1] suggested the term "silicatosis" to designate reaction to any silicate dust, but as there are hundreds of different silicates and only the fibrous varieties, collectively called asbestos, are known to provoke serious reaction his suggestion has not been generally adopted. In nature some silicates are commonly mixed with quartz, but it is probably the latter which is responsible for pulmonary damage. Hence reactions to such dusts are properly designated as modified silicosis. Possibly other silicates whose effects have not yet been evaluated may subsequently prove to be dangerous in their own rights, but if they are it will not be because they are compounds of silicon but because of some special peculiarity of structure or composition.

In the temporary category are the pneumoconioses that are known chiefly from shadows cast on a roentgenogram. They may have a foundation of pathologic reaction, but it has not yet been adequately defined. However, the changes in the film are associated with so few authentic symptoms that their influence is viewed with skepticism. Here belong the so-called baritosis seen in men who are exposed to dust of barium sulfate and the false nodulation of arc welders. The former, described by Arrigoni,[2] may be nothing but the shadows of compact collections of radiopaque barium particles in the lungs. Likewise, Enzer's [3] report of a single autopsy on an arc welder makes it seem probable that similar collections of iron particles rather than foci of fibrous reaction are responsible for the "nodular" shadows seen in occasional roentgenograms.

Finally there is the whole group of reactions to organic dusts that are properly included under the term pneumoconiosis. One form said to be due to cotton fiber has been named byssinosis but no good description of its pathologic manifestations can be found in the literature. In general it is assumed that most of the organic dusts may cause bronchitis with or without sensitization phenomena resulting in a variety of allergic symptoms. Moreover the reaction to dust composed of living organisms is in one sense a pneumoconiosis, but such conditions are generally classified as infections. They are beyond the scope of this paper. Likewise, definitely toxic dusts such as lead are excluded. Even without this group it will be appreciated that the term pneumoconiosis includes many different conditions and does not necessarily imply disabling disease of the lungs.

The first paper of the series [4] dealt with specific causes. It reviewed some of the complex factors which govern the behavior of fine mineral particles suspended in air and attempted to point out how they influenced the inhalation of dust. It discussed the varying capacities of different kinds of minerals to provoke reaction once they had accumulated in sufficient quantities within the lungs and indicated that some might inhibit the dangerous effects of free silica. It considered the influence of coexistent infection and the

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1. Badham, Charles: Notes on a Fine Type of Pneumoconiosis Produced by Silicates and Other Minerals, extract from the report of the Director General of Public Health, Year 1927 (New South Wales), Sydney, Australia, Government Printing Office, 1929.

2. Arrigoni, Arturo: Pneumoconiosis from Barium, Med. d. lavoro, **24**: 461-468 (Dec.) 1933.

3. Enzer, N., and Sander, D. A.: Chronic Lung Changes in Electric Arc Welders, J. Indust. Hyg. & Toxicol. **20**: 333-350 (May) 1938.

4. Gardner, L. U.: Etiology of Pneumoconiosis, J. A. M. A. **111**: 1925-1936 (Nov. 19) 1938.

subject of individual susceptibility with a review of the factors proposed to explain this phenomenon.

The present paper will be concerned with the pathologic reactions to different minerals in normal and in infected human lungs. It will take up the evolution of the various disease processes and, when possible, describe the shadow pattern cast on roentgenograms of the lungs.

PROTECTIVE MECHANISMS

When one considers that in quiet respiration the average human being inhales some 12,000 liters of air every twenty-four hours and then recalls the varying degrees of atmospheric pollution created in our industrial civilization, it is apparent that the lungs must be protected against dust or they could not escape becoming clogged with foreign material. In all the higher animals, at least, two sets of mechanisms have developed designed to keep their lungs clean: one prevents dust particles from entering the lungs; the other removes the particles that elude the first barriers.

Dust particles are caught in the mucus secreted by the membrane lining all parts of the tract. Ciliary action then transports them to the nasopharynx, from which they are excreted.

Lehmann [5] has suggested that such activities play only a minor role in the removal of dust in the nose and thinks that the shape of its cavities has much more effect. He has pointed out that the nasal passage consists of dilated anterior and posterior portions separated by a narrow constriction in the vicinity of the turbinates. He recalls that when dust-laden air is blown through a glass tube with a central constriction the particles all come to rest in the distal, dilated portion owng to the sudden cooling and expansion of the air. He believes that deformities due to faulty development, disease or injury change the shape of the nasal cavities and lower their efficiency for the removal of foreign particles. The technical difficulties encountered in measuring the quantities of dust retained in the nose have prevented confirmation of his observations.

It is generally assumed that at least half of the foreign matter in inspired air will be removed by these mechanisms in the normal nose, trachea and bronchi. There has been considerable speculation but little proof of the influence of disease in these organs. It is argued that the chronic bronchitis often associated with silicosis probably permits unusual quantities of dust to enter the lungs. As a matter of observation, the lungs of animals with purulent bronchitis actually contain much less dust than those of normal ones exposed to the same concentration. The heavy plugs of secretion in the larger air passages mechanically prevent the ingress of foreign particles. It has also been pointed out that one of the manifestations of chronic bronchitis is epithelial metaplasia with the formation of a smooth lining membrane that should permit freer passage of dust particles into the lungs. One should remember, however, that such metaplasia is practically never generalized and that it almost always involves one or two bronchi immediately adjacent to a focus of chronic disease inside the lung. Such a condition might account in part for the unusually heavy deposits of dust in the localized pulmonary focus of infection, but it would have little influence on the rest of the lungs. Thus some phases of tracheitis and bronchitis may be protective mechanisms, and until their influence has been evaluated it is best to refrain from inference.

The discussion thus far has dealt only with particulate foreign bodies, but where fibrous materials are concerned the upper respiratory protection would seem to be less adequate. Since asbestosis constitutes one of the dangerous forms of pneumoconiosis to be discussed, certain exceptions to what has been said must be noted at this point. Apparently many of the long asbestos fibers succeed in sliding over the surface of ciliated epithelium, for the lungs contain plenty in excess of from 10 to 20 microns in length, and occasional ones as long as 200 microns have been discovered. These fibers seem to pass through the smooth walled bronchi quite readily, but when they reach the respiratory bronchioles the alveolar pouches given off from the sides of these tubes entrap and retain them. Whether the same is true of all fibrous foreign bodies has not been established.

Little is known about the primary distribution of inhaled foreign particles within the lungs or the factors which govern it. It has been observed that carmine particles reach the subpleural alveoli within half an hour after animals have been exposed to heavy atmospheric suspensions of such material. The path of these particles, the influence of tidal and residual air, the effect of deep or shallow breathing all remain to be investigated. Posture and specific gravity probably have little influence on particles as small as 3 microns or less in diameter.

Secondary deposition of inhaled inert particles, on the other hand, has been investigated more extensively. Gross inspection of the lungs often shows streaks of pigmentation in the pleural surface, arranged in bands that are opposed to the intercostal surfaces, with little or no deposit in the intervening grooves formed by the ribs. Likewise the diaphragmatic surfaces are practically free of dust. Such distribution implies that pressure of overlying parts has prevented local deposition. Furthermore the heaviest deposits tend to occur in the upper two thirds of the pleura, suggesting that the greater excursion of the lower portion of the lung may have limited retention. Examination of a section of the lung is not so informative because the various structures are cut in so many planes. However, inspection with a lens will usually demonstrate fine linear deposits along the connective tissue septums, between lobules and around the medium sized blood vessels. The walls of the bronchi always show much less pigmentation. In very severe cases of pure anthracosis the entire lung may be uniformly black. Almost always the lymphoid tissues within the lungs and those of the nodes at their root are more or less heavily pigmented.

To understand this distribution of inhaled pigment one must appreciate the mechanisms provided for its elimination from the air spaces. These mechanisms include the mobile alveolar phagocytes and the pulmonary lymphatic system.

Alveolar Phagocytes.—These originate in the walls of the air spaces, become detached and are capable of independent ameboid activity. Their origin is still debated, but it is my own belief [6] that they belong to the general group of wandering cells of connective tissue, variously known as histiocytes, clasmatocytes and the like. Others think that they may be modified epithelial cells from the alveolar lining and some observers consider them monocytes that have wandered out of the blood vessels. This is not the place to discuss the evidence for these views. Whatever their origin, these

5. Lehmann, Gunther: Die Filterung der Atemluft und deren Bedeutung für Staubkrankheiten, Berlin, Julius Springer, 1938.

6. Gardner, L. U., and Smith, D. T.: The Origin of the Alveolar Phagocyte, Am. J. Path. 3: 445-460 (Sept.) 1927.

cells appear in the alveoli in numbers corresponding to the quantities of inhaled foreign bodies. As chance contacts are established, the particles of dust are ingested by the cells.[7] The process may be repeated so often that many phagocytes contain enough foreign material to obscure their internal structure. Often the cell enlarges as it engulfs more particles. The phagocyte moves slowly over the inner surface of the air space until it finally comes to rest in the vicinity of a lymph vessel. Whether there is any force which guides its course has never been established.

Lymphatic System.—The final stage in the process of freeing the air spaces of accumulated foreign particles is a function of the lymphatic system. Space forbids a complete description of the pulmonary lymphatics but it should be recalled that the lungs are provided with two sets of lymph vessels, one coursing through the pleura and another located in the connective tissue sheaths of blood vessels and bronchi. The superficial and deep sets communicate with one another by means of short thick vessels situated in the septums between subpleural lobules; these permit lymph to flow from the interior of the lung to the pleura in case of obstruction in the deep system. Wherever lymphatic trunks communicate with one another inside the lung there are masses of lymphoid tissue. These points are located in the pleura, at the distal ends of the alveolar ducts and where blood vessels or bronchi bifurcate. The lymphoid nodules increase in size as the hilus is approached. Both superficial and deep lymphatics discharge most of their lymph into large nodes located about the bifurcation of the trachea, referred to in this communication as the tracheobronchial nodes. Efferents from the lower portion of both lungs pass through the crura of the diaphragm to nodes situated along the esophagus and cardiac end of the stomach.

Dust particles are carried into the lymphatic vessels either by mobile phagocytes or in the free state. The mechanism in the latter case is not understood.[8] Many come to rest in and about intrapulmonary lymphoid deposits; more are borne along and deposited in the tracheobronchial nodes. In experimental animals the first deposition is in the nodes, and as these structures become filled increasing quantities are found in the successively peripheral nodules of pulmonary lymphoid tissue. Strachan and Simson [9] described similar deposition in human lungs.

Not all the inhaled material is removed to the lymphoid tissues; in most lungs considerable pigment is also found in the areolar tissue surrounding the lymph vessels. These deposits often seem to be made up of elongated collections of free particles packed between the fibers of connective tissue. Haythorn,[10] however, has demonstrated that many of these particles are actually contained within the bodies of compressed phagocytes. On production of an edema that separates the fibers and allows the "dust cells" to assume their more familiar spherical form, the intracellular distribution of the particles again becomes recognizable.

It is not known whether such perilymphatic deposits are composed of material that is temporarily stored in the areolar tissue until it can be carried off through the lymphatic vessels or whether, having entered a vessel at some peripheral point, it has subsequently escaped into the surrounding tissue. In any event such deposition occurs in the pulmonary framework, a location where the foreign body can exert no influence on respiratory function.

These perilymphatic and lymphoid tissue accumulations of particles are responsible for the pigmentation seen on gross inspection of the lungs. On the pleural surface the delicate tracery of lines is made up of accumulations in the areolar tissues about the superficial lymph vessels; the focal collections occur in lymphoid tissues at the junction of communicating and superficial lymph vessels. Similar relationships exist in the depths of the lungs. The generalized diffuse pigmentation often seen in the lungs of persons dying during exposure to dust is due to free and phagocytosed particles still within the air spaces. In cases in which diffuse pigmentation is still present years after exposure has ceased, the "drainage" mechanisms have been inadequate to remove the excess of inhaled particles. However, the next section will indicate that even within the air spaces most kinds of particles produce no apparent changes that could interfere with respiratory function.

THE HISTOGENESIS OF PNEUMOCONIOSIS

Phagocytosis and Concentration of Dust.—It is in the phagocytes that foreign bodies first exert their specific influences on living cells and that differences due to physicochemical composition of the irritant become manifest. Inert substances like garnet, silicon carbide and aluminum oxide have no effect on the structure of the cell, although they may retard or stop its locomotion by their mass within its cytoplasm. Frequently such overloaded phagocytes are found within the alveoli years after exposure to dust has ceased.[11]

Toxic free silica, on the other hand, quickly injures the phagocytes, and its effect is directly proportional to the number and size of the ingested particles. Such effects are most readily observed in experimental animals killed at intervals during exposure to high concentrations of siliceous dust, but they can also be seen in human cases of rapidly developing silicosis. No changes are visible in the cell that has taken up a few large fragments 4 or more microns in diameter, but when the particle size is under 3 microns the number ingested by each cell is much greater and, as a consequence, the amount of surface in contact with cytoplasm is greatly increased. Degenerative changes closely simulating those in the "epithelioid" cells of tuberculosis then become manifest. The cell enlarges, droplets of visible lipoid appear in the cytoplasm and the elements stained supravitally with neutral red are rearranged to form patterns indistinguishable from those in tuberculous epithelioid cells.[12] With the proper concentration of the irritant, the nucleus divides repeatedly as the cytoplasm increases in extent; the result is a giant cell in every way comparable to the Langhans giant cell of tuberculosis. In animals injected with extremely fine silica, such giant cells may attain astounding size with several hundred nuclei. Under very potent stimulation the cell is killed and undergoes

7. Fenn, W. O.: The Phagocytosis of Solid Particles, J. Gen. Physiol. **3**: 439-464 (March) 1921.

8. Drinker, C. K., and Field, Madeleine E.: Lymphatics, Lymph and Tissue Fluid, Baltimore, Williams & Wilkins Company, 1933.

9. Strachan, A. S., and Simson, F. W.: A Preliminary Study of the Pathology of Silicosis as Seen on the Witwatersrand: Silicosis, International Conference at Johannesburg, Geneva, 1930, pp. 221-248.

10. Haythorn, S. R.: Experimental Edema as an Aid to Histopathologic Studies, Warthin Ann. Vol., pp. 491-502, 1927.

11. Gardner, L. U.: Studies on the Relation of Mineral Dusts to Tuberculosis: III. Carborundum, Am. Rev. Tuberc. **7**: 344-357 (July) 1923.

12. Gardner, L. U.: The Similarity of the Lesions Produced by Silica and the Tubercle Bacillus, Am. J. Path. **13**: 13-23 (Jan.) 1937.

a process that Mavrogordato [13] described as "mummification." It retains its normal size and the limiting membrane is intact, but all internal structures fail to stain with histologic dyes. Some of these "ghost cells" preserve their identity, but others probably break up and liberate their contents, which are then taken up by new phagocytes.

The great similarity between the effects produced by crystalline silica and tubercle bacilli [12] has puzzled many observers, but Fallon [14] has proposed a hypothesis and already published preliminary experiments which may contain the explanation. He conceived the idea that the action of both these primary irritants on the phagocytes liberates toxic phospholipids and that these substances are responsible for the further proliferation that results in the formation of the granulomatous nodule. He demonstrated that such lipids, at least partially freed of silica, were actually capable of producing tubercles.

Finally there is a suggestion that small quantities of silica taken up by phagocytes tend to stimulate ameboid activity,[15] for in early silicosis the cells seem to migrate to lymphoid tissue more rapidly than in any other form of pneumoconiosis. However, it is difficult to be certain whether the clusters of cells observed in and about the nodes have actually migrated there or whether new ones may have proliferated under the stimulation of the toxic material.

The response of the phagocytes to fibrous asbestos requires special comment, as it is treated in a different manner from particulate material. The fibers are often too long to be completely ingested by a mononuclear or giant phagocyte. Frequently one end will project beyond the border of the cell, or sometimes several phagocytes will attach themselves to a single fiber. Giant cells do not migrate far and most of them are either applied to the walls of the bronchiole or at most have penetrated its substance. It is practically impossible to discover fibers or asbestosis bodies in the more remote intrapulmonary or mediastinal lymphoid tissues.

For all dusts the mechanisms of phagocytosis and concentration have many common features but, as indicated, even the initial cellular responses are modified by the properties peculiar to the three classes of minerals under consideration. Because these changes are microscopic, it has been convenient to consider them together. We are now in a position to consider the three generally recognized anatomic forms of reaction to mineral dusts under the headings benign nonspecific pneumoconioses, silicosis and asbestosis.

THE BENIGN NONSPECIFIC PNEUMOCONIOSES

In the category of benign nonspecific pneumoconiosis is included every known reaction to mineral dust except that to the soluble poisons such as lead, the specific diseases, silicosis and asbestosis, and "roentgenologic conditions" such as baritosis and the pseudonodulation of arc welders, previously mentioned.

We have seen that the action of the alveolar phagocytes and the lymphatic system tends to concentrate particulate mineral matter, regardless of its chemical composition, in the lymphoid tissues of the lungs and mediastinum and that there are also appreciable accumulations in the areolar tissues about lymphatic trunks. The reaction that will be produced in these locations is determined by the physicochemical properties of the minerals concerned. As shown in the first paper, on etiology,[4] most of them exert no appreciable effects on connective tissues; a few can produce low grade chronic inflammation which is not progressive and does not terminate in fibrosis appreciable on gross examination. All these reactions occur in the framework of the lung. The only secondary effect is the dilatation of the few air spaces that directly abut on the pigmented connective tissues. Such emphysema never involves other parts of the lung and is too restricted in extent to have functional significance.

Gross appearances are determined largely by the color of the inhaled dust. If it has no color, no abnormality may be detectible. If in masses it appears black, the diagnosis will probably be "anthracosis" in the absence of a history of exposure to a specific kind of mineral; really it makes little difference. The pleural surface of the lung is flecked with focal and linear deposits of pigment. The cut surface shows the linear collections in the septums between lobules, the thin streaks along branches of the pulmonary arteries and the rounded flecks scattered here and there which a lens identifies as perivascular accumulations about cross sections of arterioles. The air spaces are always visible in the colored areas, a feature which distinguishes the benign pneumoconiosis from all silicotic reactions. Both the intrapulmonary and the mediastinal lymphoid tissue stand out in sharp contrast by reason of their color. In extreme cases the pigmentation is diffuse and the entire pleural and cut surface of the lung may be black. But in no case is there enough reaction to be detected by palpation or gross inspection.

The shadows cast by such changes on a roentgenogram tend to exaggerate their importance. Except in the most advanced cases the pattern is merely one of exaggeration of the normal lungmarkings. Since most of the latter are due to the blood vessels, their shadows become heavier and the finer branches are visualized when they are thickened by a sheath of dust and chronic inflammatory reaction. In advanced cases the film may present a reticulated appearance due to the thickening of peripheral arterial twigs and the interlobular septums. The diffuse haziness observed in certain cases may be caused by the presence of great numbers of phagocytes scattered throughout the air spaces. Enough of them in superimposed planes of tissue will intercept some of the x-rays and register a haze on the film.

Since the blood vessels may be thickened from causes other than deposits of dust in their outer coats and since such thickening becomes increasingly frequent with advancing age,[16] there is a great possibility of error in ascribing the exaggerated linear markings seen in a film to occupational factors. In older persons particularly one must beware of diagnosing benign nonspecific pneumoconiosis from a roentgenogram and a history of exposure to dust.

It is hard to imagine that pulmonary symptoms or disability could be produced by reactions of this character. There is generally no involvement of the alveolar walls at all. While in advanced cases there may be a little emphysema, it is confined to only a few air spaces immediately about the pigmented connective tissues of the lung. Even in extreme cases presenting

13. Mavrogordato, A.: Studies in Experimental Silicosis and Other Pneumonokonioses, South African Institute for Medical Research, No. 15, 1922, pp. 1-58.

14. Fallon, J. T.: Specific Tissue Reactions to Phospholipids: A Suggested Explanation for the Similarity of the Lesions of Silicosis and Pulmonary Tuberculosis, Canad. M. A. J. **36**: 223-228 (March) 1937.

15. Gardner, L. U.: Studies on Experimental Pneumoconiosis: VIII, Quartz Dust, J. Indust. Hyg. **14**: 18-37 (Jan.) 1932.

16. Gardner, L. U.; Durkan, T. M.; Brumfiel, D. M., and Sampson, H. L.: Survey in Seventeen Cement Plants of Atmospheric Dusts and Their Effects upon the Lungs of 2,200 Employees, J. Indust. Hyg. & Toxicol. **21**: 279-318 (Sept.) 1939.

diffuse pigmentation the lung is still elastic and the respiratory membranes show no abnormality. If symptoms are associated with such reactions they are in all probability due to causes outside the lungs.

As far as can be learned from statistical and experimental evidence, the dusts other than free silica are not responsible for alteration of natural susceptibility to tuberculous infection. There is no proof that their inhalation increases the probability of infection with other organisms. In some of the dusty trades, investigation is disclosing that other factors than the dust are responsible for pulmonary infection.

Scars or imperfectly healed infections in the lungs of persons exposed to these inert or practically inert minerals are sometimes a cause of confusion. They attract and retain abnormal quantities of inhaled dust particles and it is possible, though not yet proved, that such deposits may maintain a preestablished chronic inflammatory reaction. Hence there may be less contraction and less tendency for the area of disease to disappear. Such an outcome is not inevitable, but many more cases will have to be followed in serial roentgenograms before its frequency is established.

Much more puzzling are the patients with obvious fibrosis whose history records only exposure to inert minerals. In most of these instances a review of the facts and a chemical examination of the tissues will disclose that there has been free silica either in the last or in previous exposures. An apparently comprehensive occupational history and the histologic evidence of a single autopsy specimen does not warrant the inference that a mineral other than free silica has caused the fibrosis. Quartz dust masquerades in unsuspected places where much ingenuity may be needed to detect it.

SILICOSIS

Initial Phase.—As already intimated, silicosis begins like the reaction to any other particulate dust, but the peculiar properties of free silica are responsible for subsequent modifications of the standard pattern. Migratory phagocytes concentrate silica in and about the lymphatic system of the lungs. The toxic particles, directly or indirectly through the released lipoids, stimulate connective tissue cells in their immediate vicinity and proliferation ensues. The ultimate result is a nodule composed of connective tissue whose fibers are characteristically modified by the effect of the silica. The location of these nodules, situated in the immediate vicinity of the lymphatic trunks, impedes the free flow of lymph. Such a development of microscopic silicotic nodules in the tracheobronchial lymph nodes and intrapulmonary lymphoid tissues constitutes the primary phase of silicosis.

Grossly these early nodular lesions are invisible or recognizable only with a magnifying glass. Usually there is enough carbon or other colored dust inhaled with the silica to produce the linear and focal pigmentation previously described for inert nonspecific pneumoconiosis. Obviously a roentgenogram of such a lung will reveal the shadows of the perivascular desposits but not those of the nodular lesions that are too small to be seen without a microscope.

A history of exposure to a dust rich in free silica with a roentgenogram showing only exaggeration of the linear lung markings presents a problem in diagnosis. I myself believe that if other causes can be eliminated the case should be classified as a benign nonspecific pneumoconiosis, for there is nothing pathognomonic about the film and there is at least only one chance in four that the disease will subsequently progress to nodulation. Others will argue that the history should be given more weight, and they would call such cases presilicotic.

If silicosis in this early state is not definitely diagnosable during life, has it any significance? Will it progress? Does it increase susceptibility to tuberculosis? The probabilities of progression to a stage of generalized nodulation are slight if the exposure should be interrupted at this stage. This is not necessarily true in the case of a worker such as a sandblaster whose exposure has been heavy and who has attained the stage of linear exaggeration rapidly. With ordinary exposures, however, there would not be enough silica accumulated in the air spaces to produce fresh nodules if no more dust were inhaled. With regard to susceptibility to tuberculosis, statistics on groups of men exposed to relatively high concentrations of silica show a slightly higher incidence of this infection in those with exaggerated linear markings than in those with no visible evidence of reaction to dust. The odds are against a silicotic origin in an individual case, but it could not be proved that silica was not a factor, particularly when atmospheric concentrations of this mineral may have been high.

If there is no probability of progression or no increase in susceptibility to tuberculosis, does early silicosis of this degree have any influence on the body? The only effect thus far discovered is the increased probability that continued exposure to silica dust will ultimately result in more advanced stages of silicosis.

The latter raises problems of administration, the answers to which depend on local conditions and the status of the subject. If the individual is young and linear exaggeration has developed quite rapidly in an environment heavily polluted with free silica dust, he should probably be transferred to some other position. If he is older and serial roentgenograms have shown that such changes have been present for a long time, he can unquestionably remain where he is, especially when an enlightened management is making every effort to reduce the concentration of dust in the working atmosphere. His roentgenographic changes may be due to other causes and hence will not progress because of these conditions.

At this stage of the disease there is no disability or any limitation of respiratory function because the lesions do not encroach on those portions of the lung in which respiration occurs. If physical examination discloses evidence of disability, the cause must be found outside the lungs.

Discrete Nodulation of Classic Silicosis.—After enough silicotic reaction has developed in the lymphoid tissue to retard the flow of lymph, fresh increments of inhaled silica are not as readily removed from the pulmonary air spaces. The phagocytes still ingest particles and migrate with them over the surface of the alveolar lining. Unexplained conditions in the lymphatics (possibly increased lymph pressures) now seem to prevent the cells from entering the vessels. As a matter of observation, most of them collect in groups scattered here and there on the walls of the air spaces. Again the high local concentration of silica results in proliferation of connective tissue cells. Parenchymatous nodules now develop, which ultimately attain a diameter of 3 or 4 mm. They are characterized by the sharp definition of their borders, by their uniform composition of hyaline collagen fibers arranged either

in concentric laminas or in coarse basket weave and by their regular distribution throughout all parts of both lungs. Certain variations are encountered, but these do not cause difficulties in diagnosis. The centers of young nodules may be necrotic when the disease evolves rapidly. Peripheral accumulations of nonsiliceous dusts may cause a fringe of more cellular connective tissue that more or less modifies the usual sharpness of the border. The costophrenic portions of the lungs may contain no nodules owing to the development of emphysema in these areas subsequent to the contraction of the many fibrous foci in other parts of the lung. In the early case the tracheobronchial lymph nodes are enlarged, but as the scar tissue contracts they shrink and become exceedingly hard.

The shadows of these larger nodules uniformly distributed throughout the parenchyma of both lungs form a characteristic roentgenographic pattern. When associated with a history of adequate exposure to silica dust and an absence of any very marked physical signs, such a film constitutes an adequate basis for the diagnosis of silicosis. Clinicians generally classify cases of silicosis in three stages, defined by the number and size of the nodular shadows. In stage 1 the linear markings are markedly exaggerated and the nodulation is barely visible; in stage 2 the linear shadows are obscured and each nodule is from 2 to 3 mm. in diameter; in stage 3 the nodules measure from 3 to 6 mm., are less well defined and show a tendency to confluence in certain areas. There is generally a suspicion of associated infection in films interpreted as stage 3.

The clinical significance of generalized discrete silicotic nodulation is not nearly as great as inspection of the film might indicate. Roentgenographic surveys always reveal many cases which have developed entirely unsuspected by the subjects, who have continued to perform their habitual work with no symptoms of respiratory embarrassment. Only shortness of breath on sudden and unusual exertion demonstrates that the respiratory reserve has been reduced. In other words, there is still so much uninvolved lung tissue that normal respiration is unimpaired. Persons with nonclinical silicosis are not disabled and from a medical point of view are employable. Since they are usually skilled by virtue of long experience, the management would generally prefer to keep them at work. However, liability for compensation has complicated the picture and has been responsible for a lamentable rejection of many able workmen.

The nodular stage of silicosis is associated with a definite increase in susceptibility to tuberculosis. This is attested by the old South African figures, which showed tuberculosis of the lungs in 75 per cent of the silicotic miners who died. In the Saranac Laboratory autopsy series active tuberculosis was present in 65 per cent of the lungs of persons exposed to free silica dust and in only 15 per cent of those working in other dusts. Official figures from the Factory Department of the British Home Office [17] disclosed evidence of tuberculosis in 59.4 per cent of the autopsies on silicotic subjects.

The infection may develop as a result of reactivation of a preexisting latent tuberculous focus, but opinion today is unanimous that new infections from without are a more common cause. A contact with the tubercle bacillus, which in normal subjects would perhaps be quite harmless, is apt, in the silicotic lung, to result in chronic progressive infection. Obviously such contacts cannot occur unless there are open cases of tuberculosis in the locality. In areas in which general living conditions have improved and routine antituberculosis hygienic measures have been put in practice the tuberculosis rate has fallen, among the silicotic as well as among the other members of the community.

The case for nontuberculous infections is not so clearly documented and today it would be well to turn back to Collis's Milroy Lecture of 1915,[18] in which he took great pains to show that pneumonia is relatively uncommon with silicosis though prevalent with "the pneumoconioses that cause bronchitis." Other statistics were published subsequently, however, that showed high frequencies of pneumonia in different dusty trades, and autopsies on silicotic subjects demonstrated the common occurrence of massive areas of fibrosis which closely simulated the end result of an organized pneumonia. Most observers came to believe that the same mechanisms which increased susceptibility to tuberculosis also favored the growth of pneumococci and other bacteria. Thoughtlessly silica was accepted as the common etiologic factor.

But new investigations of silica industries showed that excessive pneumonia rates did not prevail in all of them. Then the importance of exposure to extremes of temperature, humidity and the like assumed proper significance in the silica industries as in others. In mining groups it was shown that the pneumonia rate dropped to approximately that of the local community when the change house was moved to the head of the shaft so that the sweaty, overheated miner no longer had to expose himself to winter weather on coming to the surface. Similarly it is now believed that in the foundry the influence of sudden changes of temperature is much greater than the silica dust, to which only a few of the employees are exposed in dangerous concentrations. In many modern mining areas the incidence of pneumonia is no higher than that in the general population, and the course of the disease when it does develop is usually normal.[19]

Pathologic material uncontrolled by a knowledge of general clinical experience may be misleading, owing to selection of cases submitted for examination. It may well be true that some of the massive conglomerate foci seen in lungs are the result of organized pneumonia, but serial roentgenograms of certain silicotic groups make it appear doubtful whether organization is the common outcome.

Experiments by Vorwald, Delahant and Dworski [20] show that in rabbits silicosis alters in no way susceptibility to type III pneumococcus or the course of the resultant pneumonia. It is anticipated that similar tests will be made with other types of this organism.

Until accurate statistics based on reliable clinical and bacteriologic data for pneumonias of different origins become available, it would be unwise to generalize. At the present time, however, American experience does not seem to indicate that silicosis has an appreciably unfavorable influence on lobar pneumonia. Possibly infections due to organisms outside the pneumococcus group are in a different category.

17. Merewether, E. R. E.: A Memorandum on Asbestosis, Tubercle **15**: 109-118 (Dec.) 1933, 152-159 (Jan.) 1934.

18. Collis, E. L.: Industrial Pneumonoconioses with Special Reference to Dust Phthisis, Milroy Lectures, 1915, Pub. Health **28**: 252-259, 1914-1915; **29**: 11, 1915-1916.

19. Pierpont, D.: Fourth Saranac Laboratory Symposium on Silicosis, 1939, Employer's Mutuals Insurance Company, Wausau, Wis.

20. Vorwald, A. J.; Delahant, A. B., and Dworski, M.: Silicosis and Type III Pneumococcus Pneumonia: An Experimental Study, to be published.

Rapidly Developing Silicosis.—Whereas most cases of silicosis require at least from three to six and more often from ten to twelve years of exposure for their development, there are isolated industries in which exposures of from twenty to twenty-four months have produced a modified form of the disease. Under conditions that liberate excessive quantities of exceedingly fine pure silica the ordinary protective mechanisms fail to cope with the situation and an unusual kind of reaction develops. The initial phase of lymphatic involvement is lacking. The overwhelming deposits of silica seem to stimulate connective tissues in every part of the lung at the same time, and as a consequence the alveolar walls become thickened and nodules of microscopic proportions develop throughout the pulmonary framework. The air spaces are filled with actively proliferating phagocytes. Irvine [21] has aptly described the picture as a "dust pneumonia."

Gross examination reveals no nodules visible to the naked eye; there is merely a generalized partial consolidation of the lungs. All the postmortem specimens that I [22] have seen have been complicated by infection which completed the solidification of the involved areas. Because the nodules are too small to be seen without a microscope they do not cast discrete shadows on a roentgenogram. Except when infection complicates the picture, the film generally shows little but a heavy diffuse haze because most of the air spaces contain enough air to permit the passage of some of the x-rays. The diagnosis in these cases rests not on the film but on the presence of extreme dyspnea in a case in which other causes have been eliminated and on the history of an exposure to excessive quantities of exceedingly fine and pure free silica. This diagnosis is never warranted except in the case of unusually severe exposures such as those in unprotected sandblasting or in drilling pure quartz without the ventilation found in ordinary mining practice.

Most of the fatal cases terminate in tuberculosis, as indicated by Middleton's [23] summary of English experience. Foci of necrosis produced by the excessive concentration of fine silica in the microscopic nodules throughout the lungs furnish the most favorable medium conceivable for the growth of the bacilli. A few patients have succumbed to nontuberculous bronchopneumonias, and very rarely it is possible that the silicosis itself may cause death. However, it should always be remembered that evidences of infection are not uniformly distributed and may be hard to distinguish on gross examination of a lung heavily involved with such a reaction to dust. Review of a few small sections in one of Chapman's [24] "soap powder cases" failed to disclose evidence of tuberculosis, but so little tissue was available that the possibility of localized infection could not be excluded.

Modified Silicosis.—When the atmospheric dust is composed of a mixture of particles of free silica with those of other minerals such as coal, iron and various silicates the characteristic nodular reaction is modified in varying degrees. When the dust contains enough free silica, nodular fibrosis develops in the pulmonary parenchyma although the collagen may not show its characteristic hyaline, laminated appearance. The other minerals in the dust tend to be deposited in the interlobular septums and walls of arteries as they would in benign nonspecific pneumoconiosis, but they also collect around the margins of the parenchymatous nodules. The result is a combination of nonspecific pneumoconiosis and silicosis with the specific lesions of each modified by the presence of another type of dust. The linear perilymphatic deposits are heavier and tend to be fibrous; the nodules are larger and lack definition because of fringes of cellular connective tissue. Frequently projections from the nodules are continuous with chronic inflammation about vessels and septums. Reaction about adjacent nodules may replace considerable numbers of air spaces, giving rise to a small conglomerate focus. However, patent air spaces are always present in the involved area. The fibrosis is never of the massive obliterative type to be described later, in which the tissue is uniformly hard and rubber-like in consistency.

Generally the roentgenologist does not attempt to differentiate between these modified forms of silicosis and those produced by purer silica. In occasional extreme cases, however, the nodular shadows may lack their characteristic definition and uniformity in size, the vascular markings will be unusually heavy and there may be a background of more or less uniform reticulation.

Susceptibility to tuberculosis may be more or less favorably modified in these cases. In siderosilicosis due to hematite, tuberculous infection in both man and animals progresses for a time and then in many cases heals with the formation of masses of scar tissue. The same is apparently true of anthracosilicosis, which often requires prolonged search to discover evidence of the tuberculous element in the healed focus. In granite silicosis, tuberculous infection is much more apt to progress and terminate in cavity formation with disseminated infectious lesions.

Since most industrial dusts are mixtures, modifications of the classic picture of pure silicosis are the rule rather than the exception. It cannot be too strongly emphasized that both the pathologic and the clinical manifestations of silicosis in different industries are not identical in all details. Observations that are perfectly valid for anthracosilicosis may be inapplicable to miners of other hard rock, granite cutters or porcelain workers.

Massive Conglomerate Fibrosis.—This pathologic feature of the disease is the common cause of most of the disability in silicotic subjects. Unfortunately it presents vexatious problems in diagnosis and administrative treatment. During life it may be difficult to differentiate it from the simple conglomerations just described under modified silicosis. In this country and in South Africa most observers think that massive conglomerate fibrosis is due largely to associated infection. In recent years I have come to feel that a third essential factor may be the presence of minerals other than free silica. At the present time it is impossible to classify all areas of conglomerate fibrosis on an etiologic basis. Microscopic examination reveals an element of tuberculosis in 60 per cent of the cases; in the remainder this feature is either absent or escapes detection because it is obscured by the silicotic fibrosis. Although most or perhaps all of these massive fibrous lesions may have developed on a background of tuberculosis, the

21. Irvine, L. G.: Report of the Commission to Enquire into the Possible Prevalence and Origin of Cases of Silicosis, in the Colony of Southern Rhodesia, Salisbury, Government Stationery Office, 1930.
22. Gardner, L. U.: Pathology of So-Called Acute Silicosis, Am. J. Pub. Health **23**: 1240-1249 (Dec.) 1933.
23. Middleton, E. L.: Industrial Pulmonary Disease Due to the Inhalation of Dust with Special Reference to Silicosis, Lancet **2**: 1-9 (July 4), 59-65 (July 11) 1936.
24. Chapman, E. M.: Acute Silicosis, J. A.M. A. **98**: 1439-1441 (April 23) 1932.

problem is to recognize the ones in which the infection is still active. For them some form of treatment is indicated. No treatment in use today is ideal, for all of them tend to promote healing by fibrosis and it is the scar tissue that causes the disabling dyspnea.

Names were coined by the Miners Phthisis Medical Bureau of South Africa to indicate reciprocal relationships between silicosis and tuberculosis in these chronic forms of the disease. "Tuberculosilicosis is the modification produced in silicotic lesions by a chronic tuberculous infection." Here the dust factor is dominant. "Silicotuberculosis," on the other hand, is a clinical term used to indicate that the infectious element is more prominent. On the suggestion of Dr. L. G. Irvine, chairman of the bureau, the last International Silicosis Conference in Geneva adopted the pathologic term "tuberculosilicosis" as the standard one to describe this specific chronic lesion. It is not applicable to every manifestation of tuberculosis in the silicotic lung. When the infection develops typically, as it does in nonsilicotic subjects, the diagnosis should be "silicosis with tuberculosis." Such cases are rare, however.

The anatomic picture of massive conglomerate fibrosis is variable, although there are certain features that characterize all such lesions. The involved area is hard and rubber-like, is blue-black or gray-black, has rather sharply defined borders and is practically always associated with high grade compensatory emphysema. If the area of involvement extends to the surface of the lung there is always chronic fibrous pleurisy with adhesions. Most cases occur in organs showing a background of generalized discrete nodulation, but there are some in which this diagnostic feature is lacking. In the latter case it is possible that contraction of the mass has drawn most of the original nodules into its orbit and that the more peripheral portions of the organ have subsequently been distended by emphysema.

The distribution and extent of the fibrosis varies. The massive scars occur most often in the upper part of one or both lungs. Some radiate from the hilus; some assume the form of wedges with their bases on the pleura; others grow as tumor-like masses in the depths of the lung. They may involve the whole of a lobe and even extend across an obliterated interlobar fissure.

The cut surface of the conglomerate focus generally shows a more or less well defined nodular structure, but at times this is recognizable only with a magnifying glass. Some show central areas of caseation and cavity formation indicative of their tuberculous origin; others are traversed by irregular slitlike openings filled with inky fluid. The latter have no well defined walls and are not differentiated by color from the surrounding fibrosis.

Microscopic sections reveal nodules embedded in a matrix of heavily pigmented hyaline fibrous tissue that replaces practically all normal pulmonary structures. Blood vessels show high grade obliterative endarteritis and often their lumens are filled with dust-containing connective tissue. The larger bronchi are compressed and distorted. When patent, they present advanced chronic inflammatory changes. Tuberculous reaction may be obvious in widespread caseation, but in cases in which the infection has healed it has sometimes been necessary to search over 200 square centimeters of section to discover isolated noncaseous tubercles. In a few cases even this evidence is lacking, but clumps of acid-fast bacilli without cellular reaction are found in areas of softening. Guinea pig inoculation has supplied proof that the organisms are tubercle bacilli. Examination of the black slitlike cavities has generally revealed no suggestion of tubercle and these cavities have been interpreted as areas of anemic necrosis resulting from the obliterative endarteritis.

In view of the difficulties of diagnosis it would appear unwise to draw any conclusions as to the frequency of nontuberculous massive conglomerate fibrosis.

The shadows of such changes on the roentgenogram offer an easier problem in diagnosis when they occur on a background of generalized nodulation. When this is lacking even the silicotic nature of the disease may be in doubt. Stereoscopic films may permit visualization of discrete nodules otherwise obscured. Overexposed films may bring out tuberculous cavities in the midst of massive shadows, but often none can be seen. The behavior of the shadows in serial examinations over periods of years is perhaps the most reliable index of activity of the process.

The clinical manifestations in many of these cases may likewise be confusing. Often severe dyspnea is the only prominent symptom. Perhaps there has been no loss of weight. The sputum may be repeatedly negative or on rare occasions prove positive by culture or guinea pig inoculation, but if followed long enough the infection in many of these cases will become manifest. Toxic symptoms then suggest tuberculosis; bacilli are constantly present in the sputum; roentgenograms may reveal cavity formation and more rapid extension of the massive lesion. When this is the case death from tuberculosis is the outcome, but the individual in whom the infection has completely healed succumbs to other causes.

Cardiac Involvement.—The question as to the relationship between silicosis and disease of the heart is still debated. Observers primarily interested in silicosis who are following the course of the disease in groups of employed workmen are unanimous in their opinion that cardiac complications are not unusually common. They admit that some silicotic patients exhibit symptoms referable to the heart but point out that the age group in which silicosis develops is also the one in which arteriosclerosis and myocarditis are general. The clinician whose experience is limited to the general hospital, on the other hand, is confronted with a selected group of silicotic subjects. These men have applied for hospitalization because they are sick and often about to die; those who are obviously tuberculous may be transferred to sanatoriums. Thus the internist is naturally impressed by the high proportion of cardiac conditions among his silicotic patients. The pathologist's views are likewise colored by the source of his material. Cardiac complications are rare in able-bodied workmen killed by accidents, but they are not at all exceptional in the older men who die in hospitals at the age of 55 or 60 years. Furthermore, both clinician and pathologist may form unusual concepts of the disease if their material is drawn from a single industry. For example, the anthracosilicosis of the hard coal miners is especially prone to manifest itself as massive conglomerate fibrosis, and it is quite probable that such disease may cause more cardiac complications than the discrete nodulation of sand pulverizing or some other kind of mining.

Cor pulmonale is primarily a disease of the right side of the heart resulting from obstruction to the circulation in the lung. One of the most common

causes of such obstruction is high grade emphysema. Silicosis of the massive conglomerate type is liable to produce such emphysema. No one doubts that many patients with long-standing silicosis complicated by conglomerate lesions caused by associated tuberculosis finally die of congestive heart failure. But the same is also true of patients with uncomplicated tuberculosis, and yet one rarely speaks of this infection as a common cause of "heart disease." Personal experience and the reports from the literature have convinced me that in most fatal cases of silicosis the heart is already damaged by arteriosclerosis or other causes and that the presence of a conglomerate area of fibrosis with emphysema merely adds to its burden. At the autopsy table hypertrophy of the right side of the heart without arteriosclerosis and even greater involvement of the opposite side is a rarity. Clinically no one has ever demonstrated evidence of increasing strain on the right side of the heart as the successive phases of simple discrete nodulation make their appearance. Even in the case of massive conglomerate fibrosis cardiac symptoms are relatively late manifestations. Further clinical and pathologic studies will be valuable as far as they differentiate between the types of pulmonary lesions that are alleged to have affected the condition of the heart muscle.

Carcinoma of the Lungs and Silicosis.—General interest in the subject of pulmonary cancer has been responsible for special effort in securing autopsies in such cases. The discovery of coexistent silicosis or even a benign nonspecific pneumoconiosis has led to the deduction of causal relationships that are not supported by statistical evidence. Vorwald and Karr [25] collected from the literature the results of roentgenographic examinations of 57,362 persons at work in industrial plants creating dust of various kinds. Although the group contained 12,206 with silicosis, there were only three cases of cancer of the lung. In the Saranac Laboratory surveys of five different industries, films of 15,587 individuals were reviewed with the discovery of 1,357 cases of silicosis. In the total group there were only three cases of pulmonary cancer, one in a silicotic subject and two in nonsilicotic subjects. The authors' most impressive autopsy statistics were quoted from the 1930 Report of the Miners' Phthisis Medical Bureau of South Africa. This official publication cites postmortem figures on 4,510 adult males including 3,117 European miners and 1,393 European males with no underground exposure. The frequency of pulmonary carcinoma was as follows: 1,393 European males, no underground work, 0.93 per cent; 1,679 European miners, no silicosis, 0.71 per cent, and 1,438 European miners with silicosis, 0.70 per cent.

Theoretically, silica should be less likely to initiate a malignant proliferation of epithelium than the tubercle bacillus. The latter not infrequently does cause metaplasia of bronchial epithelium and sometimes carcinoma eventually results. In uncomplicated silicosis, however, there is no effect on the epithelial elements that give rise to cancer. The silica stimulates only the fibroblast or connective tissue cell. If anything there should be an excess of pulmonary sarcomas, but these have not been reported.

In spite of the occasional coexistence of silicosis and primary carcinoma of the lung indicated by published autopsy reports, it is felt quite definitely that the silica has no etiologic significance. The only dusts known to cause pulmonary carcinoma are those of the radioactive ores in Schneeberg.[26] Possibly, as Campbell's [27] experiments have suggested, the tar in road dust may also be significant; but this awaits proof.

ASBESTOSIS

It will be recalled that protective mechanisms of the upper respiratory tract appear to be less effective against fibrosis than against particulate foreign bodies and that mobile phagocytes do not remove long fibers from the pulmonary air spaces. As a consequence the greatest accumulation of inhaled asbestos fibers occurs in the lumen of the respiratory bronchiole, the point at which they first come to rest. Almost none are found in the areolar tissues about lymphatic trunks or in the lymphoid tissues inside or outside the lungs. Reasons for believing that the stimulus from inhaled asbestos may be mechanical rather than chemical have been discussed in the first paper on etiology.[4]

Microscopic Appearance.—As long as asbestos fibers continue to be inhaled, scar tissue develops as a gradually thickening sleeve about the respiratory bronchioles. Either because the bore or the tube is smoothed out by the obliteration of the lateral alveoli or because of changes in the lining epithelium, subsequently inhaled fibers then pass on into the alveolar ducts. Here a similar sleeve of fibrosis develops, and this formerly irregular tube likewise permits fibers to pass farther into the lungs. Reaction in the walls of the terminal air spaces ultimately results in a localized patch of obliterative fibrosis of the parenchyma of the lung.

A random microscopic section through an area of fibrosis does not reveal a uniform obliteration of every air space. Here and there are many that still contain air; some are of normal size, some are compressed and many are greatly dilated. These patent air spaces are apparently supplied by other bronchioles that did not happen to be involved in the primary fibrosis. Their intrusion into the area of scar formation is easily understood on reference to Miller's [28] models of the terminal branches of the bronchial tree. His diagrams show that the terminal air spaces of different bronchial systems are packed together in such a manner that a single section will contain alveoli given off from widely separated bronchi. Many writers have described this condition as bronchiectasis, but emphysema would seem to be a more apt term as the larger bronchi and bronchioles are never involved.

The scar tissue of asbestosis is in no way peculiar. Unlike that of silicosis, it fails to show a characteristic hyaline swelling of the collagenous fibers. Its arrangement is usually diffuse rather than nodular, although occasional cases such as those reported by Lynch and Smith [29] may present a few nodules. Their presence suggests that there may have been an unrecognized contamination of the inhaled dust with free silica.

Because the fibers are not transported, the asbestosis bodies which develop from them will be found very

25. Vorwald, A. J., and Karr, J. W.: Pneumoconiosis and Pulmonary Carcinoma, Am. J. Path. **14**: 49-57 (Jan.) 1938.

26. Saupe, E.: Bemerkungen zur Beurteilung der Silikose als entschädigungspflichtige Berufskrankheit, Klin. Wchnschr. **9**: 1352-1356 (July 19) 1930.

27. Campbell, J. A.: Cancer of Skin and Increase in Incidence of Primary Tumors of Lung in Mice Exposed to Dust Obtained from Tarred Roads, Brit. J. Exper. Path. **15**: 287-294 (Oct.) 1934.

28. Miller, W. S.: The Lung, Baltimore, Charles C. Thomas, Publisher, 1936.

29. Lynch, K. M., and Smith, W. A.: Pulmonary Asbestosis: II. Report of Case, Am. Rev. Tuberc. **23**: 643-660 (June) 1931.

largely within the scar tissue around bronchioles and the air spaces which they supply. But, as Gloyne [30] has pointed out, commercial asbestos usually contains particles of various contaminating minerals. Physiologic mechanisms within the lung are responsible for the sorting out and removal of much of this particulate matter to the pulmonary framework and lymph nodes. There it sets up a nonspecific pneumoconiosis the color and intensity of which depend on the quantity and character of the contaminant. After the development of parenchymatous fibrosis the particulate matter is not removed so readily. Its retention in the patches of reaction due to the asbestos is responsible for the pigmentation seen in advanced cases of asbestosis.

Gross Appearance.—These observations make it easier to appreciate the variable gross picture in asbestosis. The obvious changes consist of patches or strands of dense scar, which are irregular in size, shape and distribution. In advanced cases they are gray or black and included in all of them are thin-walled, dilated air spaces that vary from a few millimeters to a centimeter or more in diameter. Fibrous pleurisy plus a variable amount of pigmentation in the walls of the pulmonary arteries and interlobular septums complete the grosser changes.

More careful inspection, perhaps with the aid of a magnifying glass, demonstrates numerous minute, ill defined patches of fibrosis widely scattered throughout the parenchyma. If they happen to be sufficiently pigmented by minerals other than asbestos, such foci will stand out sharply like those illustrated in color in Gloyne's [30] article, but only one of the twenty-eight cases in my collection even approximates this picture. The borders of these lesions invariably lack the sharp definition of the silicotic nodule. Here and there the plane of section will cut one of these areas in such a manner that the thick-walled bronchiole with its peripheral fan of fibrosis is clearly recognizable. The lens demonstrates the presence of dilated air spaces within each fibrous area if these are not already large enough to be seen with the naked eye. Elsewhere the air spaces will be visible, but their walls are much less prominent. The patches of fine fibrosis, scattered throughout the lung, are not sufficiently large or dense to be palpated individually, but they increase the general consistency of the organ and limit its crepitation.

It is now felt that the fine, diffuse fibrosis with emphysematous dilatation of included air spaces constitutes the characteristic feature of asbestosis. Whether the grosser patches of scar tissue represent merely an intensification of the same process in localized areas or whether they are due to reaction to dust in the scars of healed infection is not altogether clear. Sometimes they occur as a thin zone beneath and paralleling the pleura, an arrangement hardly suggestive of infection; at others, more localized patches of scar simulate old foci of infection. The chronic pleurisy is probably not a reliable index of infection, as it seems to occur whenever subpleural air spaces are involved. The thickening of blood vessels and interlobular septums are variable accompaniments due to accidental contaminants in the inhaled dust. The same is true of reaction in the tracheobronchial nodes.

Roentgenograms.—Compared with the microscopic appearances, the roentgenographic shadows of early or even moderately advanced asbestosis are surprisingly slight. A faint haziness throughout the lower lung fields together with more or less evidence of chronic pleurisy are the only unusual features of these cases. Pleural manifestations may be limited to visualization of the transverse fissure of the right lung. There is also more or less exaggeration of the linear markings, but the specificity of this reaction is questionable. As shown by Gardner, Durkan, Brumfiel and Sampson,[10] in cement workers the frequency of such exaggeration tends to increase more with age than with dust exposure. Dreesen, DallaValle, Edwards, Miller and Sayers [31] concurred but found more of this type of reaction in old asbestos operators than in persons not exposed to dust and less than in those of the same age exposed to kaolin dust. As suggested in the section on pathology, linear exaggeration is probably an accidental accompaniment of asbestosis and in my opinion should not be considered as an index of early reaction to the fibrous silicates.

In far advanced cases there is a heavier diffuse shadow throughout the lung fields, whose appearance has been compared to that of ground glass. Its uniformly fine granular texture is undoubtedly due to the superimposed shadows of the small patches of fibrosis in the parenchyma alternating with patches of radiotranslucent patent air spaces. The very advanced case may show in addition many small flecklike shadows on the generally hazy background. The shadows never present the sharp definition of silicotic nodulation. The so-called porcupine heart, said to characterize advanced asbestosis, is manifested by heavy linear shadows that radiate into the lung fields from the surface of the heart. They may be cast by pleuropericardial adhesions.

Clinical Symptoms.—The symptoms most commonly reported are an irritative cough and dyspnea; some would also include weakness and chest pains. A dusky color suggesting cyanosis, clubbed fingers and blood streaked sputum are symptoms of advanced disease whose frequency apparently varies in different locations. Dreesen and his associates [31] find that cough and dyspnea are by far the most common symptoms and that their frequency increases with the intensity of change visualized in the roentgenogram. Of the patients with far advanced cases 82 per cent had both; of those with moderately advanced cases 72 per cent complained of cough and 68 per cent were short of breath. Since the dyspnea must be due largely to associated emphysema, it is quite conceivable that this symptom should appear early and explain the incidence of dyspnea in 33 per cent of persons whose films showed only second degree linear exaggeration. These observers discovered no greater frequency of cardiac involvement than in industrial groups in general. Others have reached the opposite conclusion, but here again allowances must be made for the source of their material. Theoretically there would seem to be greater reason to suspect cardiac involvement in cases of simple asbestosis than in simple silicosis. Further study is needed to elucidate this point.

Merewether,[17] who gave a classic description of this disease, reports that a minimum of seven years' and more commonly eleven years' exposure to high concentrations of asbestos dust was necessary to produce a serious degree of reaction in the English plants. In this country Dreesen and his associates [31] found the

30. Gloyne, S. R.: Morbid Anatomy and Histology of Asbestosis, Tubercle **14**: 445-451 (July), 493-497 (Aug.), 550-558 (Sept.) 1933.

31. Dreesen, W. C.; DallaValle, J. M.; Edwards, T. I.; Miller, J. W., and Sayers, R. R.: A Study of Asbestosis in the Asbestos Textile Industry, U. S. Pub. Health Bull. 241, 1938.

minimum duration somewhere between five and nine years, depending on the character and concentration of the dust inhaled. At this time 27 per cent of exposed workers were involved, and among those with more than fifteen years of employment the percentage rose to 60.

The question of progression after cessation of exposure has had various answers. Merewether [17] and Ellman [32] both believe that asbestosis invariably progresses to a fatal termination once enough fiber has been entrapped in the lungs. The former reports one case in which a mattress maker died eight years after ceasing an employment of four years and five months. An autopsy revealed far advanced asbestosis, but unfortunately there had been no films to indicate the extent of the progression. Mills [33] reported a case in which a man died of congestive heart failure approximately thirty-two years after an intermittent exposure of three years. I was privileged to study sections from this patient, but if there had been any progression it had not involved much of the lungs. There were a few small patches of pulmonary fibrosis containing rare atypical asbestosis bodies. Lanza [34] is of the opinion that "it is by no means certain that asbestosis progresses as does silicosis after withdrawal from dust exposure." In experimental asbestosis of guinea pigs the pulmonary reaction retrogresses after removal from the dust rooms. On the basis of mechanical injury there should be no progression, for the rounded surfaces of the asbestosis body would produce less trauma than the rough ends of the freshly inhaled fibers.

Diagnosis depends on a history of adequate exposure, evidence of characteristic roentgenographic changes and the clinical picture. Asbestosis bodies in the sputum are confirmatory but alone they do not indicate disease. Any one may inhale a few asbestos fibers, but their number is too small to be significant. In routine examination of sections of the lung I have discovered occasional asbestosis bodies in a dozen or more cases in which no history of exposure to this dust could be obtained.

Susceptibility to pulmonary infection in asbestosis is not nearly as well defined as in the case of silicosis. English writers like Merewether,[17] Ellman [32] and Gloyne [30] are impressed by the high incidence of tuberculosis among the disabled patients and those who died. American statistics based on surveys of employees in different plants, on the other hand, show relatively little tuberculosis. Dreesen and his associates [31] reported only two cases of active infection among 541 persons exposed in the asbestos fabricating plants of North Carolina. However, some 150 employees had been discharged fifteen months previously. Of the latter, seventy-one were examined by Shull,[35] who reported eight cases of tuberculosis, only two of which were active at the time. In the entire group "the degree of infiltration was only slight to moderately advanced, and one or both upper lobes were involved." He found that thirty-five of the patients had moderately advanced asbestosis, of whom two subsequently died or were dying of tuberculosis, twenty had far advanced asbestosis with two more cases of tuberculosis. This would make a total incidence of 7.2 per cent for the discharged group. The figure for the entire group of employed and discharged subjects cannot be computed as so many of the latter have not been traced. McPheeters,[36] among 210 employees from the same district, found an incidence of active tuberculosis of 2.8 per cent. In Pennsylvania, Fulton, Dooly, Matthews and Houtz [37] discovered two cases of healed tuberculosis among fourteen persons with asbestosis. In 1936 Lanza [34] summarized all the available evidence and failed to find convincing evidence of a great excess of tuberculosis.

The autopsy statistics are more suggestive. Egbert [38] reviewed the cases reported up to 1935 and found that six out of twenty-eight showed complicating tuberculosis. Merewether [17] reports an incidence of 35.7 per cent in forty-two fatal English cases. Dreesen and his associates [31] include autopsy reports in three cases with no tuberculous complications. My own series, which includes twenty-eight specimens, most of which have been previously reported elsewhere, contains nine cases of active chronic tuberculosis. While these autopsies reveal a high incidence of such infection, their number is too small to compensate for the factor of selection. The data from the surveys probably constitute a more reliable index.

In experimental animals asbestos dust [39] has nothing like the effect of free silica on associated infection. Like gypsum, iron oxide and other nonsiliceous minerals, asbestos may cause tuberculous infection to progress for a time, but it subsequently heals with a marked tendency to scar formation. The fibrosis from the infection then retains excessive amounts of inhaled asbestos and unusually large patches of scar develop in the pulmonary parenchyma.

The cause of death in the remaining cases has been certified as nontuberculous pneumonia, myocarditis, pulmonary cancer and a miscellany of other conditions.

Tuberculosis may be an unusually frequent cause of death in certain groups of asbestos workers, but at present it seems more probable that nonspecific hygienic factors and general living conditions are responsible. The actual frequencies of nontuberculous infections and primary cancer of the lungs are unknown. One must not be misled by a comparatively small number of postmortem reports.

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33. Mills, R. G.: Pulmonary Asbestosis; Report of Case, Minnesota Med. **13**: 495-499 (July) 1930.
34. Lanza, A. J.: Asbestosis, J. A. M. A. **106**: 368-369 (Feb. 1) 1936.
35. Shull, J. R.: Asbestosis: A Roentgenographic Review of Seventy-One Cases, Radiology **27**: 279-292 (Sept.) 1936.
36. McPheeters, S. B.: A Survey of a Group of Employees Exposed to Asbestos Dust, J. Indust. Hyg. & Toxicol. **18**: 229-239 (April) 1936.
37. Fulton, W. B.; Dooly, Allan; Matthews, J. A., and Houtz, R. L.: The Nature and the Amount of Dust Encountered in Asbestos Fabricating Plants on the Health of a Group of Workers, Commonwealth of Pennsylvania, Department of Labor and Industry, Harrisburg, special bulletin 42, 1935.
38. Egbert, D. S.: Pulmonary Asbestosis, Am. Rev. Tuberc. **31**: 25-34 (Jan.) 1935.
39. Gardner, L. U., and Cummings, D. E.: Studies on Experimental Pneumoconiosis: VI. Asbestosis, J. Indust. Hyg. **13**: 65-81 (Feb.) 1931.

Effect of Flying on the Ear.—Flying has no significant effect on the external ear, but the middle and inner ear are the source of a great amount of difficulty. The magnitude of the ear problem in aviation may be judged from the fact that pilots suffer more frequently from occupational disturbances of this organ than from all other occupational diseases combined and that it is the most frequent cause of discomfort among passengers on commercial air lines. The conditions of flight which most affect the ear are changes of atmospheric pressure during ascent and descent, noise, and possibly vibration. At the present time the former is increasing in importance as a result of the increased climbing ability of modern aircraft, while the two latter conditions are decreasing in importance as a result of recent advances in aircraft design.—Armstrong, Harry G.: Principles and Practice of Aviation Medicine, Baltimore, Williams & Wilkins Company, 1939.

THE TEACHING OF THE OCCUPATIONAL DISEASES

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LOS ANGELES

It is obligatory that education fulfil the requirements born of a changing social and economic philosophy: that it be harmonious with the constantly altering pattern of vocational needs. While the biologic inheritance of a race remains practically unchanged from age to age, education is always relative to some concrete and evolving social situation. Hence the problem of education assumes one form in ancient Athens, yet quite another in twentieth century America. What was adequate in our fathers' time is now inadequate. It is clear, therefore, that any group charged with the task of shaping the educational theory or practice for any people should consider the trends and interests of the society which it serves. Medical education is no exception to this truth. Although usually deliberate, and in this instance dilatory, it has always met each new exigency. Yet the excision of the old and the implantation of the new have ever been fraught with objections from those members of the medical faculty whose vision has reached the "fixed period." Periodically, inevitable inclusions within the curriculum are met with objections from this group, on the basis that the "course is already overcrowded." No doubt roentgenology, orthopedics, psychiatry and other subjects now taught were once confronted with this same opposition.

Today, seeking admission into the sanctum of clinical teaching comes a knock from occupational diseases, and the urgency of the situation demands that the door be opened to them. Many educators and those who practice medicine outside the fence of industry will wonder why this phase of medicine is apparently receiving sudden emphasis. For these, a brief enumeration of the precipitating factors seems appropriate.

THE LEGAL ASPECT

Workmen's compensation was initiated as an experiment but has since become an established institution, now being in effect in all but two states. Originally designed to compensate for "injuries by accident," the first laws excluded disability not traumatic in origin. Today twenty-two states make provision for all or some occupational diseases. Ominous signs indicate their rapid inclusion by the remaining states. After such enactments the responsibility shifts from a few to all physicians. The existing system of consigning the sudden fracture or laceration to the plant or company physician will continue. In such cases the causative factors are rarely in doubt. But the workman with insidious disease will consult his family or neighborhood physician, on whom will be imposed the duty of determining whether the patient's condition is occupational or nonoccupational in origin. In every city, hamlet, mining center or farming district a workman's ill health will become a medicolegal problem. The foundation for the equitable fixation of liability, therefore, rests on diagnosis. It is apparent that the legal recognition of occupational disease has not been paralleled by the medical profession.

THE MEDICAL ASPECT

The etiology of illness has been abundantly augmented within the past few years. Unto the diseases of commonalty have been added those which find their cause in dusts, fumes, solvents, metals and noxious gases. Since the World War, the pace set by creative genius in the manufacturing of new products and the devising of new processes has resulted in a dizzy multiplication of hazards. The potentialities represented by 32,000 research workers, now engaged in industrial and consulting laboratories, portend annual additions. In Maryland, for instance, 41,000 workmen may be expected to be exposed to carbon monoxide, 32,000 to organic dusts, 30,000 to metallic mineral dusts, 34,000 to substances apt to produce dermatitis and 8,000 to the inhalation of silica dust. Three fourths of the industrial population studied were subjected to exposure to one or more of the forty-three groups of material listed in the survey. These figures, quoted from bulletin 236 of the United States Public Health Service, may be multiplied many times for those states which are larger industrially. Also certain states have hazards not found, or at least not prevalent, in other states, as for example the synthetic nitrate production in Virginia, the rayon industry in Pennsylvania, the petroleum industry in Pennsylvania, California, Oklahoma or Texas, and the mineral mining in the Western states.

THE EXISTING INADEQUATE SERVICE TO INDUSTRY

The situation would not be so grave if it were confined to the larger industries. Efficient medical supervision as to prevention, diagnosis and treatment prevails in the larger corporations. But the small plant or company employing ten, fifty or 100 men lacks such supervision, although the hazards are just as great. The employer is financially unable to maintain his own medical staff and is therefore dependent on the physician next door or around the corner. It is with the training of this physician that medical education must concern itself.

THE BURDEN ON INDUSTRY AND THE INJUSTICE TO WORKMEN RESULTING FROM ERRORS IN DIAGNOSIS

Do the occupational diseases present a diagnostic problem distinct from that of the ordinary ills of life? If the reader is to obtain an adequate conception of the dissimilarity between general medicine and industrial medicine, let him answer the following question, meanwhile tabulating for his own information the data his research discloses: What are the signs and symptoms attributable to the illness allegedly arising from the occupation of a furrier, fumigator, sand blaster, welder, maker of felt hats, abrasive soap maker, cotton sorter or degreaser (textile); from employment with refrigeration, vulcanizing or photography, or from working with rayon, benzene, cement dust, carbon disulfide, carbon tetrachloride, aniline dyes, pottery, chromium or methyl chloride or with solutions used in electroplating, glass etching or dry cleaning? Having listed these signs and symptoms, state whether the illness is apt to be acute and temporary, without sequelae; sudden, with death ensuing or permanent disability resulting; or insidious, with or without permanent disability.

These are but a few of the exposures in the hundreds of occupations which incorporate potentially harmful materials, processes or environments. Does not the preceding questionnaire indicate the changing complexion of medicine?

THE SOLUTION

Occupational diseases can be taught in practically every medical school in this country, beginning next fall. Offhand, such an assertion appears as an overstatement. True, room cannot be made for them in the present curriculum as easily as one sets an extra plate for the unexpected dinner guest. A separate course will eventually obtain only after progressive readjustment. But the subject can be made an active component of the clinical years by including it in the differential diagnosis during the ward walks or dispensary teaching without discommoding the course. To this, certain voices can be heard saying "But we do this now whenever we have an opportunity." That is not sufficient. It is too casual, too occasional, and characterized by dependence on chance. It would be comparable to studying aortic stenosis only when a case happened to come the way of that particular clinic. Accomplishment of purpose will require a planned, supervised system, together with interdepartmental cooperation. Occupational diseases can be added to the curriculum without additional hours, equipment or particular enlargement of the faculty. I am cognizant of the trend away from didactic teaching. In no way does the proposed plan violate that principle.

The first step in the accumulation of suitable clinical material for demonstration should be the creation of a division of occupational diseases in the outpatient department under the direction of a physician. He should be rich in industrial experience, with a strong sense of the possibilities of correlating the instruction of this kind with the programs of other departments, as for example medicine, dermatology, toxicology, traumatic surgery, and preventive medicine and public health. Once established, such a department could quite conceivably form the basis for the formation of a separate discipline in the medical school for instruction in the wider aspects of industrial health, particularly along graduate lines as the need for specialization clarifies, and to provide means for special investigations. It is not necessary for the director to have had teaching experience, nor need he be expected to teach, but he should have ability to organize. In every center such men are available. His first objective should be to gain the cooperation of the plant and industrial physicians of a community who represent a wide variety of industries. In the suggested scheme this group represents the "department of supply." Monthly meetings with the director, at which time material and methods of presentation are discussed, would constitute a seminar from which would flow an exchange of ideas valuable to the department and instructive to this group of plant physicians. This setup having been established, the office of the director becomes, in the parlance of Hollywood, a central casting bureau. In it will be registered the cases on call, and from it the cases will be assigned to the clinic best suited for their study.

A suspected case of lead poisoning admirably serves to emphasize the advantage of this method of linking teaching with industry. In the present system, isolated from the industrial physician's aid, the student, and too often the teacher, is forced to refer to the standard textbooks of medicine. The following quotation is from a recent volume on the "Practice of Medicine": "The diagnosis of lead poisoning rests upon finding the blue line in the gums and the presence of numerous basophilic cells in the blood smear. Absolute confirmation is obtained by detecting lead in the urine or feces."

How misleading! The blue line isn't necessary and is likely to be absent. Basophilic stippling is not pathognomonic, and lead can be detected in the urine and feces of normal persons. Contrast such insufficient information with the suggested manner of study.

A paint sprayer consults his plant physician regarding recently developed gastrointestinal symptoms which the workman feels are due to lead poisoning. Following a "thorough work-up" the plant physician registers this case in the department of occupational diseases. At a designated time, and bearing the necessary data, he appears before the gastrointestinal clinic. After the consideration of history, including occupational exposure, symptoms and physical examination, the possibilities of ulcer, cancer, gallbladder disease, appendicitis, allergy, neurosis and lead colic are discussed. His laboratory reports are then read, interpreted and compared with normal figures for evidences of lead in the blood smear, whole blood and twenty-four hour urine specimen.

By this method the clinician is supplied, without excessive time or effort on his part, with the essentials for a differential diagnosis. In one period the student learns concretely what constitutes a lead exposure, the distinction between normal lead absorption, abnormal absorption and intoxication, and the criteria necessary for diagnosis.

A rash appearing in the cement or rubber worker will be referred to the section on dermatology and anemia in the dry cleaner to the section on hematology; to the tumor clinic will go the patient alleging his cancer is due to industrial exposure; cough, hemoptysis or dyspnea in one engaged in the dusty trades will be studied by the group concerned with pulmonary diseases, as well as by the class in roentgenology for the consideration of pneumoconiosis. These examples are sufficient to illustrate the scheme suggested.

It is anticipated that there will be those who will consider this plan not feasible, since the workman is not a charity patient. Unquestionably there will be objections from a small percentage of patients. But the material is so abundant that out of the mass there is certain to be a sufficient number of patients from whom cooperation will be gained. The average workman is not a malingerer; he is desirous of obtaining a correct diagnosis and appropriate treatment of his case. I have experienced no difficulty in securing his cooperation in any investigation I have undertaken. It is inconceivable that in every teaching center physicians holding positions comparable to those of Drs. Selby of General Motors, Woody of Standard Oil, Cheney of Armour and Company, Hazlett of Westinghouse, Shoudy of Bethlehem Steel, Bartle of the Pennsylvania Railroad and McConnaughy of the Aluminum Company of America would not cooperate in such a plan to supply a constant stream of teaching material to the medical school.

CONCLUSION

I entertain no delusion that the plan suggested should be permanent or is without fault. I am obsessed, however, with the belief that action is imperative. Nationwide legislation imposes a medical responsibility that must be met. Until such time as deletion of certain obsolete courses takes place and room is accorded this subject befitting its importance, the plan herein suggested appears workable and obviously supplants the present hit and miss system.

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ADEQUATE NUTRITION FOR THE INDUSTRIAL WORKER

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Except for some few special circumstances affecting a minority of the total group, the problem of adequate nutrition for the industrial worker is the nutrition problem of all workers. It is the good fortune of the industrial worker that this is so. The probability that any individual can benefit by each new advance in the science of nutrition and that proper food in adequate quantities can be provided for him depends a great deal on the fundamental similarity in the nutritive needs of individuals.

This is not tantamount to saying that individual variations in nutritive needs can be ignored. Rather, one has to be on guard to find a guiding principle in medicine or nutrition in the maze of physiologic variations encountered in studies of human beings. But isn't it true that the solution of the individual problem in medicine and in nutrition involves starting with a set of rather fundamental general concepts with the avowed purpose of trying to find out the particular degree of variation that needs to be tempered? The boundaries between normal variations and frank derangements in health and nutritive state are indistinct. For this reason the boundaries between the science of medicine and the science of normal nutrition lack real definition. The practical aim of the two sciences, namely to improve the physical welfare of man, is one and the same.

First of all it must be recognized that the term "industrial workers" includes more than 8½ millions of people in this country and many more millions if one looks beyond the borders of this country. Of these 8½ millions of people in the United States who are wage earners in industry, a little more than 20 per cent are women and the rest are men. The range in age covers the whole gamut of the productive years of adult life. If the activities outside of working hours are considered, the range in activity probably encompasses the whole range of activity of humanity. If, therefore, some practical program designed to improve the nutrition of the industrial worker can be arrived at it will certainly be profitable.

ENERGY REQUIREMENTS

In the minds of many persons, industrial work is frequently associated with an extraordinary degree of physical effort, comparable perhaps to that of the athlete in training or of soldiers on a long march. This category includes many workers in the so-called heavy industries, but actually many industrial workers are not called on for heavier physical exertion than the average secretary, housewife, barber or taxi driver. However, the duties of the industrial worker are likelier to be more routinized and monotonous perhaps than the occupations just named. But it would certainly be a mistake to discuss energy requirements of industrial workers in the aggregate.

The task of estimating energy requirements can be greatly simplified by setting the maintenance need for an average man at about 2,400 calories a day and at about 15 per cent less than this for an average woman. This maintenance allowance presumably meets the energy needs for a person living an ordinary life in a temperate climate without being engaged in manual work. The League's Technical Commission on Nutrition [1] suggests the following additional allowances for muscular activity of adults:

Light work: up to 75 calories per hour of work.
Moderate work: from 75 to 150 calories per hour of work.
Hard work: from 150 to 300 calories per hour of work.
Very hard work: from 300 calories and upward per hour of work.

In assessing the energy requirements, one must not lose sight of the fact that some of the ordinary pursuits of pleasure and relaxation may be hard work in the physiologic sense. Painting and brisk walking are good examples of moderate work. Carpentry, skating, dancing and bicycling are typical examples of hard work. Sawing wood, digging, stone masonry, running and swimming are very hard work in the sense that they require rather enormous rates of energy expenditure. To assess fairly a worker's energy needs, therefore, it is necessary to consider the expenditures of energy beyond the fixed working hours, because chores and sports may affect the need very appreciably.

A great deal has been written about fatigue in industry. Strictly speaking, muscular fatigue connotes a state within the muscle fibers wherein the recovery processes during exercise have not kept pace with the processes of breakdown. An oxygen debt is built up which can be relieved by rest. If the muscle fibers lacked this ability to take on an oxygen debt temporarily, no physical effort of any considerable severity could be made. The term "industrial fatigue," however, is more generally used as referring to the lessened capacity or inclination to do work which results from the previous doing of work of the same kind. Proper nutrition is one of the factors essential to the promotion of maximum efficiency of workers. There are, of course, many other factors involved as well.

Haggard and Greenberg [2] have reported a distinct rise in muscular efficiency after meals which they associate with an increased utilization of sugar. In their experiments, muscular efficiency followed rather closely the changes in sources of energy as reflected in the respiratory quotient. The body possessed the capacity to do physical work efficiently when the respiratory quotient was at a value between 1.0 and 0.85, while below 0.85 the efficiency was observed to be low, approaching the before breakfast condition. This suggested that when sugar was being used as the source of energy for work the work was less difficult than when fat was being used. It should be mentioned that Haldi and his co-workers [3] were unable to confirm these observations, and no rational explanation has been offered to reconcile these two sets of experiments. However, Haggard and Greenberg's original contention appears to be supported by results of its practical application to the productivity of factory and office workers. For several obvious reasons, the feeding of sugar alone to workers at frequent intervals every day would not be a commendable practice; however, there

From the Bureau of Home Economics, United States Department of Agriculture.

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1. League of Nations, Health Organization: The Problem of Nutrition, vol. 2, Report on the Physiological Bases of Nutrition, League of Nations Publications, series II, B 4, Geneva, 1936.
2. Haggard, H. W., and Greenberg, L. A.: Diet and Physical Efficiency, New Haven, Conn., Yale University Press, 1935.
3. Haldi, John; Bachmann, George; Ensor, Charles, and Wynn, Winfrey: Muscular Efficiency in Relation to the Taking of Food and to the Height of the Respiratory Quotient Immediately Before Exercise, Am. J. Physiol. 121: 123-129 (Jan.) 1938.

is no violation of the principles of good nutrition in the use of more frequent meals if the sum total of food intake is thereby not made excessive and if the requirements of a well balanced diet are met.

These same investigators have described a study of between meal feedings made in a large industrial plant manufacturing rubber footwear. They selected from a series of unit operations that of sewing together (by machine) the canvas parts of the tops of tennis shoes. Rows of operators could take from a conveyor belt, as needed, baskets filled with unassembled tops, sew them together and replace the baskets, together with a slip giving the operator's number. The wage system provided a minimum hourly wage plus an additional sum based on rate of production. The hourly production of the individual operators was recorded from the number of assembled shoe tops returned to the baskets placed on the conveyor. A sustained hourly rate of production was strikingly apparent for operators accustomed to eating food in the third hour of the morning and afternoon working periods (five meals in all) as compared with those eating only two or three meals a day. The productivity of another group of operators accustomed to three meals a day improved very significantly when given in addition light lunches of milk and "angel cake" at the beginning of the third hour of the morning and afternoon working periods. The operators also volunteered the information that they felt less tired on those days when they had five rather than three meals.

Haggard and Greenberg [4] have recently reported a controlled study of the effects of between meal feedings of bananas or milk and bananas during previously established rest periods on the disposition and absenteeism of a group of 120 clerical workers in a large commercial office. There was a marked decrease in absenteeism among the employees receiving these two daily supplementary lunches. Most of the employees approved of the supplementary food and thought that they became less tired and were kept in better spirits and were more attentive to their work.

These investigators believe that it is entirely possible for persons to be relieved of a feeling of fatigue, irritability and muscular inefficiency by frequent feeding and at the same time to satisfy the requirements for a well balanced diet without overeating. Probably most of those participating in this congress could bear witness to the fact that hunger is associated with weakness, irritability, diminished ability to concentrate and disinclination for sustained work. If a daily diet of the same quantities of a well balanced selection of food eaten in five meals instead of in three meals will make persons happier and more effective, why not? The opposition will cling to two main objections—the stomach needs rest and the habit of three meals a day is firmly entrenched. Well, if one is really honest about it, isn't it the oversized meal that puts the burden on digestion and makes one dull and listless? For the gastric ulcer patient, the invalid and the convalescent, the frequent small meal is very regularly advocated—what about rest for the stomach in these cases? For those who resist change that seems to offer possibilities for betterment merely because it disturbs an established routine, neither science nor reason has an answer. This proffered change in mealtime frequency has enough basis in experimental background to warrant further trial in practical application as a possible means of promoting the health and cheerfulness and productivity of millions of workers.

4. Haggard, H. W., and Greenberg, L. A.: Between Meal Feeding in Industry: Effects on Absenteeism and Attitude of Clerical Employees, J. Am. Dietet. A. **15**: 433-539 (June-July) 1939.

PROTEIN REQUIREMENTS

Rose and his co-workers [5] at the University of Illinois have recently isolated and identified a new amino acid which they named d-threonine. As a result of this discovery it is now possible for the first time to rear animals on diets containing mixtures of known amino acids instead of proteins.

Of the twenty-two or more known amino acids, nine or ten must be considered as indispensable. That is to say, nine or ten cannot be synthesized by the body at all or not at rates sufficient to supply adequately the body's needs for them. The amino acid arginine, for example, can probably be synthesized in considerable amounts in the body but not at a sufficiently rapid rate to support normal growth. Methionine, a sulfur-containing amino acid, is one of the indispensable amino acids, while cystine, a sulfur-containing amino acid prominent in the composition of hair and nails, apparently is not. However, diets low in methionine can be enhanced with respect to their growth-promoting properties by the addition of cystine. It seems, therefore, that methionine is essential for certain bodily functions which cystine cannot satisfy but that in certain other functions cystine can spare methionine.

It is not known at present whether or not a deficiency of each one of the indispensable amino acids in the diet produces a specific syndrome. Specific amino acid deficiencies is one of the new problems awaiting the solution for which the work of Rose and his associates has pointed the way.

The day may not be too far distant when scientists will be able to speak of specific amino acid requirements rather than lumping these all together indeterminately as a protein requirement. It is well recognized that proteins from natural food sources vary widely in their amino acid makeup. Because the proteins from animal sources are richer in many of the essential amino acids than the cereal and vegetable proteins, the former proteins are spoken of as having higher nutritive value. Plant proteins in general are much lower in the indispensable amino acid lysine than animal proteins. It has also been established that higher intakes of lysine are necessary to support normal growth in small animals than of any other of the indispensable amino acids. Because the freely chosen diets of individuals vary so widely in combinations of proteins, it is important to allow a liberal margin of safety on protein intake, hoping thereby to secure adequate amounts of all the essential amino acids. It is also imperative to recommend that milk, meat, eggs, cheese and fish supply a good proportion of the protein allowance. For the average adult it would appear that equal amounts of protein from animal and vegetable sources were a very favorable source-distribution.

Many authorities have accepted a daily allowance of 1 Gm. of protein per kilogram of body weight (or 70 Gm. for a man) as probably representing a reasonable margin of safety for the protein requirements of adults. Other authorities tend to regard this quantity as "not

5. McCoy, R. H.; Meyer, C. E., and Rose, W. C.: Feeding Experiments with Mixtures of Highly Purified Amino Acids: VIII. Isolation and Identification of a New Essential Amino Acid, J. Biol. Chem. **112**: 283-302 (Dec.) 1935. Rose, W. C.: The Nutritive Significance of the Amino Acids and Certain Related Compounds, Science **86**: 298-300 (Oct. 1) 1937.

liberal" at least. Leitch [6] recently presented a reevaluation of the experimental results dealing with nitrogen balances and concludes that the allowance should be on the order of 80 Gm. per adult daiiy to provide a 50 per cent margin of safety. McCollum and his co-authors [7] of the recently revised "Newer Knowledge of Nutrition" place the adult daily allowance for protein at around 110 to 120 Gm.

Another aspect of this question should be mentioned here. Foods rich in protein of the best biologic value are, in the United States, among the more expensive types. Stiebeling and Phipard [8] have shown that as the wage earners' expenditures for food increase more money regularly goes toward the purchase of protein-rich foods. Apparently most adult wage earners much prefer a diet that provides around 110 to 120 Gm. of protein daily. It appears to be the cost that deters them when they consume less protein than this. There is very little evidence to indicate from a physiologic standpoint that adults should not consume from 110 to 120 Gm. of protein a day if it pleases them. The idea that high protein intake places an extra burden on the kidneys with resultant injury to their function and structure lacks real justification. There is no indication that the changes in these organs of normal animals fed on diets abnormally high in proteins are anything more than a normal physiologic response to increased functional demands.

The distribution of potential calory foods in most American diets is apportioned with about one eighth of the calory value from protein, one third from fat, and the remainder from carbohydrate. If approximately the same relative proportions of these three nutrients are maintained throughout the range of adult requirement for total calories the result will be a very good balance among these three important nutrients; the protein requirement will be adequately met and the worker pleased. The protein, however, should be supplied at all levels of intake in the form of a variety of animal and plant foods in order that all the indispensable amino acids shall be adequately represented.

INORGANIC ELEMENTS

The human body and the foods on which it is dependent contain a wide variety of inorganic elements. Some of the inorganic elements, notably calcium, phosphorus, sodium, potassium, chlorine, iron, magnesium, iodine and sulfur, are present in and required by the body in rather substantial amounts. Besides these, some very small quantities of other elements are essential to normal life processes. The list of recognized essential trace elements is gradually growing in numbers. Many elements, however, have not yet been subjected to a crucial test adequate to determine whether or not they should be added to the list of indispensable food elements. There is still a great deal to be learned about the functions of all the inorganic elements essential to good nutrition.

Fortunately many of the essential inorganic elements are so widely distributed in plant and animal foods that there is little danger of a real shortage of them in the varied diet of human beings. The experimental feeding of animals has been the tool by which the indispensability of many inorganic elements was discovered. Our present knowledge of the vitamins presents a similar situation. For these reasons nutritionists are agreed that man should provide himself with a wide variety of foods. In so doing the nutritionist endeavors to make certain that nothing indispensable to good nutrition shall be lacking. This is the only means at hand to safeguard the present lack of knowledge of how to compound a thoroughly adequate diet from chemically known substances. This appeal for variety in food selection is an appeal to sound common sense in view of the limitations of our knowledge of nutrition. There is no jest in this advice. The monotonous undiversified diets the world over are those most frequently associated with nutritional deficiency diseases. The medical profession should be on its guard against the long continued use of such diets in the treatment of special diseases.

Of the recognized nutritionally essential inorganic elements, calcium, phosphorus, iron and iodine need special attention because optimal amounts of these are least likely to be provided by hit and miss methods of food selection. The body adapts itself to a rather amazing extent to low intakes of these elements and conserves in large measure the allowances provided. But many times this is a forced and compromising adaptation that only softens or postpones the period of nutritive failure. Inadequate calcification of the skeleton of adults is a good example of this. The pliable bones of young children and the well calcified skeletons of adults can withstand amazing impacts of force without giving way to breaks or fractures. But almost every physician knows many adults who suffer these troubles as a result of insignificant little jolts or tumbles, particularly adults of middle age or beyond. Perhaps some of this is due to decreased secretion of certain hormones, but it is quite likely that much of it is due to their settling on a diet too largely of toast, tea and a little cake. If the body is forced to lose a little of its calcium and phosphorus day after day the time must come when the rarefaction of the bone makes it a very weak structure. It is a relatively simple matter to keep the skeleton well calcified once it is so, but of the possibility of recalcifying an adult skeleton that has lost a lot of its calcium and phosphorus I am not so certain. It is quite clear that further light is needed on this matter. For the present, the best advice that can be offered is to supply the body with liberal amounts of calcium and phosphorus as the bone develops the new structures in which these elements can be deposited and to keep right on supplying about 0.7 Gm. of calcium and about 1.3 Gm. of phosphorus daily thereafter. If the skeleton is already rarefied in inorganic elements, these quantities of calcium and phosphorus will at least prevent further rarefaction as far as proper food can protect this. A weak skeleton is a hazard in the ordinary pursuits of living as well as in the industrial occupations.

Among the common food items, not one is superior to milk as a source of calcium and phosphorus. A pint of whole or skim milk a day for every adult or the equivalent of this in the form of evaporated or dried milk would be of tremendous help in sustaining a good nutritive state in adults. And there is no need to parry the question of how to use it, for that is hardly worth the candle—consume it as you will. The popular excuse of many adults for evading the use of milk is that it makes one fat. A pint of milk carries approximately

6. Leitch, I., and Duckworth, J.: The Determination of the Protein Requirements of Man, Nutrition Abstr. & Rev. 7: 257-267 (Oct.) 1937.
7. McCollum, E. V.; Orent-Keiles, Elsa, and Day, H. G.: The Newer Knowledge of Nutrition, ed. 5, New York, Macmillan Company, 1939.
8. Stiebeling, Hazel K., and Phipard, Esther F.: Diets of Families of Employed Wage Earners and Clerical Workers in Cities, U. S. Department of Agriculture, circular 507, January 1939.

300 calories and no flight of the imagination is going to make it any greater. A pint of milk is no match for calories as compared with most customary desserts. There would be no better way to improve the nutritive state of industrial workers than to see to it that each one gets at least a pint of clean pasteurized milk a day.

An iron intake of from 10 to 15 mg. a day for a man or woman has been widely used as a guide to planning adequate diets. Further knowledge about the variations in the availability of the iron in different foods has added some new problems to the evaluations of iron requirements. In the average American diet the principal sources of iron are eggs, leafy green vegetables, lean meats, mature beans and peas, and whole grain cereals.

able iodine also provide appreciable amounts of the iodine needed by man. The regions in which iodine deficiency is common are now generally known, and this condition can be treated prophylactically by the use of iodized salt or administration of potassium iodide under adequate medical supervision. Orr and Leitch,[9] having reviewed the meager data at their disposal on actual iodine requirements, estimate therefrom that adults probably need around 0.045 mg. of iodine daily. The thyroid gland has the capacity to store iodine administered in excess of daily requirements, so that if it is necessary to administer iodides this need not be done often.

The one requirement for inorganic elements of special concern to certain groups of industrial workers is that

TABLE 1.—*A Good Low-Cost Diet**

Family Members	Kinds and Quantities of Foods for a Year											
Description	Milk, Quarts	Potatoes, Sweet Potatoes, Pounds	Tomatoes, Citrus Fruits, Pounds	Leafy, Green, Yellow Vegetables, Pounds	Mature, Dry Legumes, Nuts, Pounds	Other Vegetables, Fruits, Pounds	Eggs, Dozen	Lean Meat, Poultry, Fish, Pounds	Flour, Cereals, Pounds	Butter, Pounds	Other Fats, Pounds	Sugars, Pounds
Children under 2 years	360	80	65	80	...	...	18	...	50	7	..	3
Children 2 to 3 years	365	90	65	120	...	40	22	15	80	10	..	7
Boys:												
4 to 6 years	365	100	65	130	7	75	22	25	100	15	..	15
7 to 8 years	360-365	120	65	160	10	100	22	65	140	20	3	25
9 to 10 years	360-365	130	65	200	10	140	18	80	160	20	20	40
11 to 12 years	360-365	140	65	200	15	140	18	80	180	20	20	40
13 to 15 years	360-365	160	65	160	15	175	18	100	230	20	30	50
16 to 19 years	360-365	220	65	160	15	175	13	140	310	20	40	65
Girls:												
4 to 7 years	365	100	65	130	7	75	22	25	100	15	..	15
8 to 10 years	360-365	120	65	160	10	100	22	65	140	20	3	25
11 to 13 years	360-365	130	65	200	10	140	18	80	160	20	20	40
14 to 19 years	360-365	140	65	200	15	140	18	90	180	20	20	40
Men 20 years and over:												
Very active	180	300	65	160	25	175	13	160	420	20	60	80
Moderately active	180	160	65	160	20	175	13	130	230	20	30	65
Sedentary	360	140	65	180	10	140	18	90	160	20	20	40
Women 20 years and over:												
Very active	180	160	65	180	15	175	18	160	230	20	30	65
Moderately active	180	140	65	180	15	165	18	90	180	20	20	50
Sedentary	360	160	65	180	10	140	18	90	120	20	20	40
In pregnancy	365	140	65	250	10	200	22	90	170	20	20	40
In lactation	365	170	65	250	10	250	22	100	210	20	30	50
Yearly total for family	.....	...	..	...	..	...	..	...	...	..	..	..
Monthly total (divide by 12)	.....	...	..	...	..	...	..	...	...	..	..	..
Weekly total (divide by 50)	.....	...	..	...	..	...	..	...	...	..	..	..

* From the 1939 Yearbook of Agriculture (Food and Life).

The body naturally has nothing to gain by the ingestion of unavailable forms of iron, so that analysis of the total iron in foods is of small help unless it is also known what proportion of such iron is available. The allowance of from 10 to 15 mg. of iron for adults was based on studies of iron balances; the iron absorbed from the food could have been none other than available iron. As a result of more recent studies this allowance appears to be generous. In consideration of what data there are about the availability of iron in different foods, it would appear that the provision of from 10 to 15 mg. of total iron in the form of a mixed diet of natural foods would probably meet the more recently established estimates of an adult's iron requirements.

Ingestion of generous amounts of sea food is one way to provide for an adequate intake of iodine. The iodine in sea food is absorbed by marine organisms from the sea water, which contains about 25 parts per million of iodine. In the case of certain marine fishes, ingestion of seaweed, a very rich source of iodine, accounts for further accumulations of iodine in such fish. Drinking water and vegetation grown on soil containing available iodine also provide appreciable amounts of the iodine needed by man. The regions in which iodine deficiency is common are now generally known, and this condition can be treated prophylactically by the use of iodized salt or administration of potassium iodide under adequate medical supervision. Orr and Leitch,[9] having reviewed the meager data at their disposal on actual iodine requirements, estimate therefrom that adults probably need around 0.045 mg. of iodine daily. The thyroid gland has the capacity to store iodine administered in excess of daily requirements, so that if it is necessary to administer iodides this need not be done often.

The one requirement for inorganic elements of special concern to certain groups of industrial workers is that of sodium chloride. The average adult ingests from 10 to 20 Gm. of sodium chloride daily, the major portion of which is added as seasoning for foods. Hard work accompanied by profuse sweating or exposure to excessively high temperatures and low humidities, such as in furnace rooms, may readily lead to serious salt depletion accompanied by "heat cramps." The individual variation in salt concentration of sweat is very large. A man working under conditions involving profuse sweating may lose 8 or 9 liters of sweat in one day. If the sweat is of high salinity, the loss of salt could be on the order of 30 Gm. During acclimation of men to high temperatures, the salt concentration of the sweat is high the first few days and may decrease by more than 50 per cent during adaptation to such an environment. It is important, therefore, that new men engaged to work in an excessively hot environment be given plenty of extra salt from the start. A 0.1 per cent solution of sodium chloride in water at about 46 F. was found to

9. Orr, J. B., and Leitch, I.: Iodine in Nutrition: A Review of Existing Information, Special Report Series No. 123, Medical Research Council, London, His Majesty's Stationery Office, 1929.

be very acceptable to men working in a high temperature environment at the Youngstown steel mills and was very successful as a prophylactic for heat cramps. The volume of sweat lost as a result of continued occupation at a job involving work in high temperature environments is changed but little as time goes on. This loss of water needs to be replaced, and Talbott and Coombs [10] recommend that salt be given, at least to the extent of 15 Gm. a day, in addition to that contained in the diet, but that no attempt be made to limit water intake.

TABLE 2.—*A Good Low-Cost Diet: Approximate Quantities Needed for One Week for Specified Individuals* *

	Unit of Measure	Moderately Active Man, Quantity	Moderately Active Woman, Quantity	Boy 8 Years, Quantity	Girl 5 Years, Quantity
Flour, cereal †	Pound	4½	3½	2¾	2
Milk (or its equivalent)	Quart	3½	3½	5	7
Potatoes, sweet potatoes	Pound	3	2¾	2¼	2
Dried legumes, nuts	Ounce	6	4	3	2
Tomatoes, citrus fruits	Pound	1¼	1¼	1¼	1¼
Leafy, green, and yellow vegetables	Pound	3	3½	3½	2½
Dried fruits	Pound	¼	¼	¼	¼
Other vegetables and fruits	Pound	2	1¾	1¼	¾
Butter	Ounce	6	6	6	4
Other fats	Ounce	10	6	1	...
Sugars	Pound	1¼	1	½	¼
Lean meat, poultry, fish	Pound	2½	1¾	1¼	½
Eggs	Number	3	4	5	5

* Based on the Yearbook of Agriculture, 1939, page 338.
† Count as 1 pound of flour each 1½ pounds of bread purchased.

VITAMIN REQUIREMENTS

Altogether too much dramatic effort has been released on the subject of vitamin deficiency diseases and on the benefits purported to accrue from ingestion of large amounts of vitamin preparations. The general public has generously responded with purchase of vitamin concentrates to the extent of a money outlay of not less than $100,000,000 during the past year. There are cases of vitamin deficiency diseases in the United States, but by far the larger proportion of these unfortunate persons are among those who have not and could not afford to buy vitamin concentrates.

For the treatment of vitamin deficiency diseases, the use of vitamin concentrates is amply justified. Some of these diseases are associated with diminished capacity to absorb vitamins normally when administered orally. In such cases appropriate routes of injection are clearly indicated.

From our present knowledge of the composition of foods, it seems almost impossible that a person could contract a vitamin deficiency disease without having subsisted for a considerable time on a diet inadequate in several respects at one and the same time. The inadequacies are not even limited to the recognized vitamins. An analysis of the diets of pellagrins, for example, reveals that their diets have been wretchedly inadequate in many respects. The only sound and permanent solution to the problem of malnutrition is to educate the people and adjust the economic situation so that everybody can share the benefits of a steady, well balanced diet. To do this occasions the need for a much larger consumption of the so-called protective foods—eggs, dairy products, tomatoes, citrus fruits and leafy green vegetables. There is no known substitute for a steady, well balanced diet carrying liberal quantities of the protective foods. Such diets will provide all the known essential food nutrients in adequate amounts and in addition furnish some measure of safety against inadequacies of essentials about which there is at present no knowledge. It is absolutely certain that all the essential food factors have not yet been discovered.

Although there are many published estimates of the human requirements for several of the well known vitamins, the scientific basis for these estimates leaves much to be desired. This situation is inevitable when one stops to consider that the criteria for recognizing borderline states of vitamin deficiencies are entirely lacking in the case of some of the well known vitamins. Probably no one is entirely satisfied that such criteria as have been employed are adequate for the purpose. Under these circumstances the best that can be done is to suggest tentative allowances that embody liberal margins of safety. Such daily allowances for an adult would be something on this order:

Vitamin A, from 5,000 to 6,000 international units.
Thiamin, from 1 to 2 mg.
Ascorbic acid, from 60 to 70 mg.
Vitamin D, unknown.
Riboflavin, from 1 to 2 mg.

The estimate for vitamin A provides some margin of safety over the amount required to restore normal dark adaptation in adults exhibiting mild degrees of night blindness. The estimate for thiamin provides around a 100 per cent increase over that of diets which barely prevent mild degrees of beriberi. The estimate for ascorbic acid is probably at least twice the amount that will prevent recognizable signs of scurvy. In the case of thiamin and ascorbic acid one ought probably to aim at the upper limits of these allowances so that cooking losses for these heat-labile vitamins do not reduce the actual intake below the lower limit. Vitamin D is undoubtedly necessary for adults, probably in considerably lesser amount than children require, but there is no basis for a quantitative estimate. The riboflavin estimate is pretty much a surmise, based on quantities that accompany diets adequate in other known food essentials.

TABLE 3.—*A Good Low-Cost Diet: Approximate Nutritive Values Daily for Specified Individuals* *

	Unit of Measure	Moderately Active Man	Moderately Active Woman	Boy, 8 Years	Girl, 5 Years
Food energy value	Calories	3,070	2,510	2,130	1,750
Protein	Grams	95	78	76	68
Fats	Grams	117	94	82	66
Carbohydrates	Grams	469	388	271	214
Calcium	Grams	0.92	0.88	1.10	1.36
Phosphorus	Grams	1.54	1.33	1.42	1.40
Iron	Milligrams	15.4	10.3	12.3	9.4
Vitamin A	Int. units†	9,000	9,000	9,700	7,700
Vitamin B₁	Int. units†	610	520	560	440
Ascorbic acid	Milligrams	80	60	70	60
Riboflavin	Sherman units	720	660	730	800

* Adapted from Yearbook of Agriculture, 1939, page 338.
† International units.

For the remainder of the recognized vitamins there are no general estimates for requirements.

A PRACTICAL GUIDE TO PLANNING ADEQUATE NUTRITION FOR THE INDUSTRIAL WORKER

It is all very well to discuss the nutritive needs of the industrial worker in terms of energy, protein, inorganic elements and vitamins, but embodying all this knowledge into a simple practical plan is quite another

10. Talbott, J. H., and Coombs, F. S.: Certain Aspects of Mineral Requirements, J. Am. Dietet. A. 15:631-638 (Oct.) 1939.

matter. At this point it must be remembered that the industrial worker is usually a member of a family group who eat together at the same table. In addition, any practical diet plan must take into account the fact that families have some preferences in the choice of foods; the plan must be adjusted to fit the pocketbook, and the food should be attractive and pleasing.

The foods common in this country can be classified into about a dozen major groups. Suitable quantities of foods in these several groups can be combined to provide adequate nutrition over a period of a year, a month or a week for individuals of different age, sex and activity. Of course many combinations of these twelve major food groups can be worked out so that all the nutritive requirements which have been discussed in this paper will be amply provided. As an example of such a combination, table 1 shows the respective quantities of food in each group that will provide these nutritive essentials over a period of one year, listed opposite the descriptions of each type of family member. This particular combination of major food groups is one that can be provided at a relatively low cost. When the family composition is known it is a simple matter to read off in each of the twelve columns the quantities of foods that will supply the nutritive needs of individual members of the household. Simple addition of these quantities will provide the totals required by the family during the period of one year. If each of the sums is divided by 12 the results will give the quantities of foods in each major food group required by the family for one month; if divided by 50, the result is the approximate weekly quantities needed by the family.

If a family consisted of one moderately active man, one moderately active woman, a 5 year old daughter and an 8 year old son, this family's food requirements could be adequately met by weekly supplies of the kinds and quantities of foods (shown separately for each member of the family) indicated in table 2. These weekly allowances of food provide for the approximate daily intake of calories, protein, fat and carbohydrate as well as certain minerals and vitamins in the quantities shown in table 3.

The weekly cost of this food for these four persons would vary somewhat depending on current prices of food in the particular locality in which the family lived. According to prices reported in 1935-1936 by families of wage earners and clerical workers living in a wide range of localities in the United States, with adjustments made in accordance with trends in price levels obtained from the Bureau of Labor Statistics, this family's total food bill for one week during the period January to October 1938 would have varied (depending on the locality) between $6 and $9.50.

This diet plan provides for choice in eight of the twelve food groups as to which particular foods in the group the family elects to eat. For reasons discussed earlier, the family is urged to introduce as much variety as possible in its choices within those food groups which provide for choice. According to surveys based on about 4,000 records of weekly food consumption, Stiebeling and Phipard [4] report that approximately 50 per cent of employed wage earners and clerical workers in various cities of the United States actually spent enough money for food to obtain diets of this nutritive quality. Although they actually spent enough money to get a diet as good as the one suggested in table 1, the actual food selection of many of these families was such that the nutritive value fell short of this plan. The remaining 50 per cent did not spend enough money to obtain a diet with as good nutritive value as that suggested for a good low-cost diet in table 1. The practical problem of good nutrition is often, as was shown in these studies, a combination of educational and economic factors.

The plan of food selection outlined in table 1 is offered merely as a sample plan to show how the industrial workers and their families might solve the problem of adequate nutrition without undue expense.

PRESENT STATUS OF BENZENE

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In order to dispel any confusion concerning the present status of benzene, it is necessary to have a very definite differentiation between benzene and benzine.

Benzene (benzol C_6H_6) [1] is a single chemical substance obtained by distillation of coal tar and is purified by redistillation at from 70 to 80 C. Gasoline, or benzine,[2] is obtained from the distillation of petroleum and is a mechanical mixture of hydrocarbons ranging from C_5H_{12} to C_8H_{14}. Its composition varies according to the boiling point. At 36.3 C. it contains from 60 to 70 per cent of pentane, C_5H_{12}. Substances distilling between 30 and 70 C. produce what is commonly called gasoline.

Benzene is obtainable in several grades in commerce:

1. Benzene: Chemically pure (U. S. P. XI, p. 85) 95 cc. distils between 79.5 and 81 C.

2. Benzene 90 per cent: This is 90 per cent of the distillate up to 100 C. Composition from 80 to 85 per cent benzene, from 13 to 15 per cent of toluene, 2 or 3 per cent of xylene and 1 per cent heavy residue.

3. Benzene 50 per cent: This is 50 per cent of the distillate below 100 C., 90 per cent below 120 C. Composition from 45 to 50 per cent benzene, heavy residue of olefins, paraffins and complex bodies and some toluene.

4. Solvent naphtha: Consists chiefly of xylene, a small amount of toluene and thiophene.

A thorough knowledge of the difference between benzene and gasoline will, I believe, explain the diminishing number of cases of poisoning by the volatile hydrocarbons of the benzylic series. Benzene, toluene, xylene, naphthalene, anthracene and phenanthracene belong to the benzylic series and contain one or more carbon rings. Gasoline, on the other hand, does not belong to this series but to a lower unsaturated carbon-hydrogen combination commonly called the marsh gas series.

Pure benzene is a chemical entity, while all gasolines vary over wide ranges in composition. Commercial benzene has the following impurities in varying amounts: xylene, toluene, phenol, thiophene, carbon bisulfide, acetonitrile, pyridine and traces of many other substances.

Gasolines have no definite composition; for example, gasoline from Pennsylvania contains pentane, hexane, heptane and paraffins while gasoline from California and Texas contains cyclopentanes, cyclohexanes and cycloparaffins.

Read before the Section on Preventive and Industrial Medicine and Public Health, at the Ninetieth Annual Session of the American Medical Association, St. Louis, May 19, 1939.

1. Benzene (C_6H_6 or $PhH = 78.08$; benzol [German], benzole [French] phenylhydride, cyclohexatriene, phene) is a colorless liquid or crystals with a density at 20 C. of 0.879, melting point 5.4 C., boiling point 80.3 C.; insoluble in water and miscible with alcohol and ether, acetone and glacial acetic acid.

2. Benzine, or gasoline, is a mixture of hydrocarbons obtained from the second portion of the fractional distillation of crude petroleum which consists of the fraction boiling between 70 and 90 C. A clear colorless liquid with a density of from 0.640 to 0.675.

USES

Benzene has the following uses:

1. As a solvent for paints, lacquers and varnish, rubber and fats.
2. In color printing.
3. As a cleaning agent for clothes.
4. As a motor fuel.
5. In the chemical manufacturing industry.

Both benzene and gasoline are poisonous but benzene is quicker in its action, and the intensity is much greater. There are three avenues of entrance of benzene into the body: (1) the respiratory system, (2) the alimentary system and (3) the skin.

It is my opinion that in from 90 to 95 per cent of cases the benzene enters by way of the respiratory system, the incidence of cutaneous absorption being very small except in those cases in which the hands and arms are immersed in solutions containing a large percentage of benzene or when the hands are washed in benzene to remove grease and rubber. This procedure, however, should be condemned.

Absorption by way of the alimentary system is not great but often occurs when materials are introduced into the mouth or food that has been in the same room with the benzene is eaten or tobacco that has been exposed to benzene fumes is put into the mouth. A small percentage of benzene is dissolved in the mucous secretions of the mouth and throat and swallowed. The greater the concentration of the fumes, the greater the amount absorbed by the skin and the alimentary tract, but under controlled conditions these two avenues of absorption are practically negligible.

The human system can tolerate minute amounts over a period of many months if proper aeration and elimination are instituted. In other words, a small factor of immunity develops through an equilibrium between intake and output of absorbed material. Just as soon as a minute increase of intake over output develops, symptoms begin to appear.

The following clinical symptoms seem to me to be the most predominating after observing and examining between 6,000 and 7,000 men and women who have worked with the various compounds containing benzene or its homologues for the last twenty years:

1. Peculiar brackish taste.
2. Slight giddiness.
3. Unsteady vision and slight headache.
4. Nausea and vomiting.
5. Dizziness, "benzene jag," odor of benzene.
6. Weakness. Benzene breaks down the body defense against acute infections and many secondary conditions develop, such as (*a*) gingivitis, (*b*) boils, (*c*) pustular conditions of the skin, (*d*) frequent colds, (*e*) arthritis and (*f*) infections of the gastrointestinal tract. Hektoen has done much work on the effect of benzene on antibody formation.
7. Increased nervousness with increased pulse, nosebleed, uterine bleeding, bleeding from the gums.
8. Slight temporary increase in blood pressure.
9. Excessive fatigue at the end of eight hours' work.
10. Marked tremors of the hands.
11. Loss of equilibration in the dark.
12. Gastric and intestinal disturbances.
13. Paresthesia—numbness, tingling.
14. Insomnia—in the first stages drowsiness and in later stages insomnia.
15. Loss of weight, benzene pallor.
16. Benzene purpura, nosebleed, anemia.
17. Menstruation every two or three weeks by female employees.
18. Dermatitis.
19. Nephritis.
20. Labored respirations and coma.

With reference to anemia under paragraph 16, it may be said that many thousands of blood counts have shown that this is one of the main factors that the industrial physicians must rely on to show the effect of benzene on the individual. There first develops a slight leukocytosis, later a slight leukopenia, and erythropenia with a slight reduction in hemoglobin content. With increased absorption this progressively gets worse, and the following develops:

1. Increased leukopenia.
2. Increased erythropenia.
3. Lymphocytosis.
4. Development of few transitionals. A point is reached when the blood forming organs are nearly suppressed and the new cells do not form rapidly.
5. Decrease in coagulation, caused by a decrease in prothrombin and thrombin.
6. Decrease in blood calcium.
7. Decrease in antibody formation.
8. Severe decrease in hemoglobin formation with increase of hematin in the urine and decrease in blood platelet formations.
9. The beginning of endothelial lining cells to appear in the blood stream. The appearance of these cells indicates the serious if not the fatal stage of poisoning.
10. Complete cessation of formation of new blood cells.

I have observed in a few cases a condition of vacuolation in the leukocytes, but this is not a constant factor. It probably is due to the inability of the cells to retain fatty compounds, and I believe that fatty substances are either extracted or prevented from forming in the nerve tissue, thus producing the nervous complex. The effects of benzene are accumulative, more lasting and more severe than those of gasoline.

Temporary exposure to slight concentrations of benzene or gasolene are transient, and complete aeration causes the effects to disappear. It is the constant absorption of small amounts daily that produces the detrimental effects.

In October 1935 Yant and Sayers and their associates[4] presented a new method for controlling exposures to benzene by the determination of urine sulfates. Since Dr. Yant and his associates advocated this method of detection of the absorption of benzene, I have inaugurated it as a routine procedure for all patients who work with benzene. During the last ten months I have studied 650 workers with the inorganic sulfate method in conjunction with blood work, physical examinations, analysis of the air and any other clinical examinations which I thought might throw some light on this method. From my experience I have found several factors, which I shall mention:

1. In most industries using large quantities of benzene the fire hazard is great; when it is possible, some other solvent is combined with benzene to reduce the flash point of the benzene. The nature of the solvent determines the accuracy of the test. For example, carbon tetrachloride is often used; it causes the opposite effect from benzene on the sulfates and therefore, unless there is an extreme reduction, the results are not useful as a diagnostic factor. Ethylene dichloride is another solvent that is used with benzene and changes the results.

3. Hektoen, Ludvig: J. Inf. Dis. **19**:69 (July) 1916.

4. Yant, W. P.; Schrenk, H. H.; Sayers, R. R.; Horvath, A. A., and Reinhart, W. H.: J. Indust. Hyg. & Toxicol. **18**:69 (Jan.) 1936.

2. There is some variation on different days in the same individual working under the same concentrations. I have found that in some cases the inorganic sulfates in the urine are as low as 50 per cent one day and a recheck the following day at the same time and with the same concentration shows them to be 80 per cent. If this were a single case I would say that the discrepancy was due to technic, but a careful check of all reagents was made and controls were run to eliminate the possibility of error. I have made it a regular rule to have all urines below 70 per cent rechecked, and if this concentration persists I know that there is something wrong in the ventilation or that the individual is absorbing benzene from some other source.

3. Atmospheres containing from 100 to 115 parts per million in eight hours have but little effect on the inorganic sulfates, but over a period of time there is a slight change of from 8 to 10 points. I have not noticed any change in the blood when the concentration has ranged between 100 to 125 parts per million.

4. Alcohol and certain foods cause a change in the daily sulfates.

5. It has not been determined how long a person can work with inorganic sulfates below 50 per cent before a change in the blood occurs. I have several workers who have been working for one year and four months, with their inorganic sulfates fluctuating from 56 to 82 per cent, and their blood and all other examinations normal. These men are examined completely every month, and at the slightest change in the blood picture they are removed from contact with benzene. On several occasions I have found the inorganic sulfates between 8 and 10 per cent when the person had been cleaning clothes with benzene, but in two days, after there was no contact with benzene, the inorganic sulfates were up to 75 per cent.

However, may I impress the point of rechecking all cases in which the ratio is less than 70 per cent; if the percentage is 50 per cent or less two courses must be taken: The person must be removed from contact with benzene and the ventilation must be corrected until air samples show from 100 to 115 parts per million.

The accompanying table shows one of the numerous surveys made and the correlation between the concentration of benzene, inorganic sulfates and the blood picture.

This experiment shows the value of making frequent urinary sulfate determinations for the control of benzene absorption.

PREVENTIVE AND CORRECTIVE MEASURES

1. *Ventilation and Safety Devices.*—This is one of the most important factors. To keep the concentration of benzene in the atmosphere below a certain point one must recognize the fact that benzene fumes are heavier than air and that they are very diffusible. Ventilation from the floor by means of suction is preferable to overhead ventilation. Ventilation must be general, for benzene fumes form pockets. Benzene fumes liberated on one floor may produce a rather high concentration on a floor below if suction ventilation is not used.

2. *Healthy Persons in Operations Using Benzene.*—My experience has shown that undernourished, anemic persons or those afflicted with bronchitis, any pulmonary condition or cardiac or kidney infections should not be placed where they come in contact with benzene or gasoline fumes. Female help, as far as possible, should not be placed where there is a very high concentration of any of these fumes, for no matter how healthy they are they begin to have menstrual disturbances after some absorption.

A certain group of persons can tolerate a large amount of benzene and show but little physical effect. Those who are shallow breathers seem to be less affected than the deep breathers. There appears to be some relation between the permeability of tissue diffusion in the lung tissues and the amount of absorption which causes physical symptoms to appear. Persons addicted to alcohol seem to tolerate benzene or gasoline fumes to a greater extent than others. I attempt to place only those in fine physical condition on operations in which benzene or any allied product may have to be used, and I believe that it has been worth while.

3. *Education Program.*—Proper instructions to the supervisors and the workers in all departments in which any volatile substances are used, such as benzene, gasoline, carbon tetrachloride or other such substances, are very important. They should be told of the properties of the substance they are using, what conditions might develop from excessive inhalation or exposure to it and how these conditions can be successfully prevented by taking precautions and obeying the instructions given.

Correlation Between Concentration of Benzene, Inorganic Sulfates and Blood Picture *

Sample Number	Position	Sampling Time, Min.	Volume of Sample, Cc.	Parts per Million	Comment
1	Between D 1 and 2 neutralizers	25	150	980	Filter overflow returning to D 1
2	D unit press.....	19	150	460	Filtering
3	Platform front of C and D units	21	150	500	
4	Between C 1 and 2 neutralizers	22	150	1,471	Leak in benzene line on C 2
5	C unit press.....	15	100	600	Filtering
6	Same as No. 1.....	23	150	300	Doors closed
7	Same as No. 2.....	21	150	300	Doors closed
8	Floor half way between presses	25	200	147	Both presses filtering
9	Between C and D reactors	19	150	196	
10	Between C and D spreaders	21	150	117	

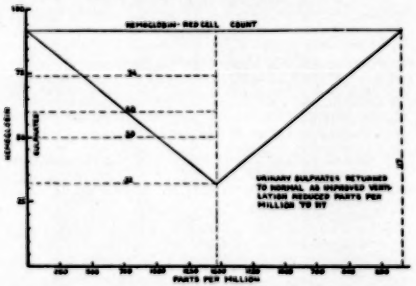
* All tests were taken at a working level of from 5 feet 4 inches to 5 feet 6 inches, where the operator's nose is most apt to be when at work. These figures were taken from the rubber industry. C 1 and 2 and D 1 and 2 designate machines.

4. *Frequent Examinations.*—All persons should be examined before being allowed to work in these departments. They should have examinations every thirty to ninety days, according to the concentrations of the vapor in the various departments. If examination of the blood, urine, blood pressure, vision, sensation and equilibration shows any indications of absorption, the person should be transferred to some other job. Workers are advised of general health principles and methods of elimination of absorbed benzene.

5. *Substitution Products in Place of Benzene.*—Many substitutions have been tried to replace benzene, such as its higher homologues toluene, naphthalene and xylene and other solvents of the unsaturated hydrocarbons. My experience has been that gasoline is less poisonous and will eventually replace benzene in nearly all operations until a better nonpoisonous solvent is found.

Batchelor [5] has done some remarkable experimenting with benzene and some of its higher homologues by using intraperitoneal and subcutaneous injections and inhalations in groups of animals. His conclusions are that toluene, xylene and hi-flash naphtha are vastly superior from a toxic standpoint and are practically devoid of the industrial hazard involved in the use of benzene. This statement is true with regard to the relations of the toxicity, but I do not believe that toluene, xylene and hi-flash naphtha can be so lightly considered.

It is not occasional exposure to these compounds that causes the harm but the daily exposure over long periods of time. Various mixtures, under commercial names, have been tried for solvents in order to reduce the flash point, thereby reducing the fire hazard. These invariably contain carbon tetrachloride. Carbon tetrachloride in small quantities, when inhaled, causes extreme nausea and often severe vomiting and should be used only in closed systems of ventilation. I have found that gasoline works almost as well as benzene in most operations, and the number of cases of dizziness and nausea has been reduced to a minimum.


HEMOGLOBIN-RED CELL COUNT
HEMOGLOBIN
ELIMINATED
URINARY SULPHATES RETURNED TO NORMAL AS IMPROVED VENTILATION REDUCED PARTS PER MILLION TO 01
PARTS PER MILLION

Hemoglobin and red cell count not affected; insufficient exposure; exposure controlled by urinary sulfate determinations.

Many things must be considered before the use of a substitute product in industry is advocated:

1. Is it injurious to the human being?
2. Is its operation more or less efficient?
3. Is its operation more or less expensive?
4. Does it require a large outlay of expense to install?
5. What is the competitor using and what is the quality of his product?

It requires very close cooperation between the medical department, the chemical department, the safety department and the production efficiency department to arrive at a proper conclusion.

METHODS OF CORRECTING CONDITIONS

The methods of correcting conditions when volatile substances are used resolve themselves into a very definite procedure:

1. Experimentation and research made on the substance used as to its detrimental effects on the human system. If such a substance causes detrimental effects, three main recommendations should be made;

A. Discontinuance of the substance, and if this is not possible, then

B. Substitution of an allied substance not so detrimental, and if this is impossible then

C. Use of the substance in a closed, airtight system, which prevents dissemination of the gases, or institution of suction ventilation, depending on the nature of the substances as to whether its gaseous form is heavier or lighter than air.

2. The rotating of the individuals who work with the substance to other jobs.

3. Use of gas marks. This has not proved very practical in industry.

4. Frequent examinations: Removal from the job of any one showing signs of poisoning, such as: (1) persistent urinary sulfates below 70 per cent; (2) slight purpura or hemorrhage from mucous membranes or other organs; (3) reduction in white cells of 1,500 below normal (a 7,000 count is assumed as normal); (4) reduction of red cells of from 10 to 15 per cent below normal; (5) reduction of hemoglobin below 80 per cent, and (6) slight variation in coagulation time.

TREATMENT

A person who, on examination, shows any effects of a solvent such as benzene or its homologues, gasoline or its derivatives or carbon tetrachloride, is immediately removed from contact with the substance. The treatment proper of benzene consists of: (1) elimination; (2) aeration, oxygen inhalations; (3) treatment of gastric disturbances; (4) treatment of secondary anemia; (5) supportive measures for the heart and protection of the kidneys; (6) stimulation of the blood-forming organs by use of iron compounds, reticulogen, liver and spleen substances, transfusions and roentgen therapy to the long bones; (7) nourishing food with an excess of animal fats; (8) increase of the calcium intake, and (9) intravenous saline and dextrose.

CONCLUSION

Experience has shown that benzene and its derivatives present a very definite and serious industrial health hazard. The primary effects of these substances are produced on the blood and blood-forming organs with secondary involvement of the nervous system and other organs. In high concentrations they cause acute poisoning, often with sudden death, and in low concentrations a slow but chronic poisoning. The hazard can be perfectly controlled by certain definite procedures:

1. Proper ventilation.
2. Substitution of less poisonous solvents.
3. Frequent examination, and the early removal of any one showing slight symptoms of poisoning, as detected by a low urinary sulfate determination.
4. Proper education of the supervisors and workers.
5. Close cooperation between the production and medical departments.
6. Establishment of physical standards for those who are going to work with benzene or any of its homologous compounds.

633 East Market Street.

ABSTRACT OF DISCUSSION

DR. A. G. CRANCH, New York: The warning is still timely not to confuse benzene with benzine. The two products are different technically and in toxicity. There are also various impurities in commercial benzene. With regard to early case finding, much emphasis is often placed on blood counts showing reduction in leukocytes and red cells. Dr. Davis has warned of the leukocytosis which sometimes precedes the leukopenia and may be misleading. Urinary tests furnish a practical guide, but Dr. Davis well emphasized the pitfalls: the

5. Batchelor, J. J.: The Relative Toxicity of Benzol, Am. J. Hyg. 7: 276 (May) 1927.

errors due to mixed solvents, the daily variations which may occur in the individual case and the failure at times to obtain a significant test even in the presence of dangerous exposure. In preventive work it is well to remember the heaviness of the fumes. This condition is present with many industrial solvents and calls generally for lateral or down draft for its removal. I would stress the value of education. I have had good results by particularly instructing workers not to inhale the fumes recklessly, and in case of an unusual or temporarily increased exposure they almost involuntarily withdraw and cease to breathe deeply. There are dangers in substituting other solvents for benzene, as sometimes the substitute may prove to be equally or more toxic. This is true also in some cases in which benzene has been diluted with other solvents. I would ask Dr. Davis what he can tell us as to recurrence of serious symptoms among patients who had apparently returned to normal after treatment for benzene poisoning. Such apparently cured persons with a normal blood picture after a slight intercurrent infection like influenza sometimes seem rapidly to grow worse. Is this usually the case? Something to bear in mind with regard to benzene poisoning is that in the patients' subsequent life great care should be exercised to avoid the exposures which might reactivate their symptoms.

DR. LOUIS SCHWARTZ, New York: As Dr. Davis stated, the use of benzene in industry is diminishing and its place is being taken by solvent naphtha or some other agent which is less toxic. Toxic symptoms usually occur from inhalation of these substances and not from contact with the skin. Dr. Davis has said that 95 per cent of the cases of benzene poisoning are due to inhalation. That is true because when these substances are inhaled they are inhaled in minute proportions and taken into the body; they do not irritate the mucous membranes or the skin. If the skin is exposed to them in concentrated form, it is defatted and blistered and its absorptive qualities are impaired. This is true of all the volatile solvents; those substances do not inflame the skin but penetrate it, and they are more likely to cause toxic reactions than those which inflame the skin. Most of these volatile solvents take the fat out of the skin. Persons who have greasy skins can withstand their action much better than those who have dry skins. This brings up the point of how to prevent dermatitis from these substances. When a person handles them he should rub olive oil or some other animal or vegetable fat into the skin to replace whatever fat has been taken out by the solvent. Another way of preventing dermatitis from these substances is to wear gloves; rubber gloves ordinarily do not withstand the action of these solvents and are easily soluble in them, so synthetic rubber should be used because that stands up much better. I should like to ask Dr. Davis what his experience has been in noting symptoms of dermatitis in cases of benzene poisoning. He will probably tell you that dermatitis is not common among those who suffer with benzene poisoning, and those who suffer from dermatitis are not so likely to have benzene poisoning.

DR. P. A. DAVIS, Akron, Ohio: In answer to Dr. Cranch's question in regard to the recurrence of symptoms with some concurrent infection, I do not believe that the patient has been discharged as completely cured before he has this condition. For instance, I had occasion recently during an epidemic of influenza to observe several men who, while they had a low urinary sulfate level, around 60 or 70 per cent, were taken off the job and subsequently contracted an influenza infection. They returned to normal slowly, probably because benzene absorption had produced some effect on the myelogenous tissues and on the spleen and prevented the normal return of the blood cells. I recall a case in which a man had had acute benzene poisoning and there developed definite leukopenia and erythropenia; his urinary sulfates returned to normal in three weeks and his blood to 95 per cent. The red and white cells returned to normal. He was not put back in contact with benzene but was placed in another position entirely free from any volatile substances, and influenza developed. After his influenza apparently cleared up he still seemed to have benzene poisoning, and the only explanation I have for that is that the blood-forming organs had not returned to normal before he had a subsequent infection or some other involvement. It takes a long time for the blood-generating organs to return to normal antibody formation. They remain as a stationary factor for some time after the blood picture and the urinary sulfate picture have assumed a normal status. With regard to the dermatitis caused by benzene, acute benzene poisoning does not necessarily show up as a skin condition at all. The dermatitis from benzene is contact dermatitis and not systemic dermatitis. In only a few cases does systemic dermatitis result from benzene poisoning. With regard to protection of the workers, I have a hard time convincing the engineers that, since nobody has been killed or poisoned while manufacturing these materials, no one should be poisoned or killed while using them. If proper protection is given, whether against benzene, a halogenated compound or any other volatile substance with toxic effects, by masks or whatever safety devices are available, I do not think any trouble will be experienced. The organization with which I am connected has instituted the use of a wax ointment. Men who are going to work with benzene smear it all over their hands, arms and faces. This ointment is not soluble in benzene, so they have little absorption but sufficient skin protection. •I think there must be external protection against all these substances if acute absorption is to be avoided.

THE CARDIOPATHOLOGY OF HEATSTROKE

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SEATTLE

Under the term "heatstroke" are herein included four deaths from hyperpyrexia, one caused by insolation or "sunstroke," and three from artificially induced pyrexia by the so-called fever machine.

Historically this affliction is as old as Biblical times, being described in 2 Kings (Osler [1]). The early Arabians felt that Sirius, the Dog Star, in some way was responsible for the symptomatology and called the disease "siriasis." During the British occupation of India and subsequently, heatstroke has received considerable attention, but the pathologic condition in the fatal cases has apparently been decidedly secondary to the clinical manifestations. Osler [1] dispenses with the morbid anatomy in these few words: "Rigor mortis occurs early and putrefactive changes may come on with great rapidity. The venous engorgement is extreme, particularly in the cerebrum. The left ventricle is contracted (Wood) and the right chamber dilated. The blood is usually fluid; the lungs are intensely congested. Parenchymatous changes occur in the liver and kidneys."

Webster [2] also dismisses death from heatstroke with this concluding sentence: "The autopsy findings will be those due to either syncope or asphyxia." From the condition at autopsy of the four cases to be presented it would appear that the cardiac lesions found in all the cases closely approximate those found in death from electricity or lightning as described by Kratter (quoted by Webster) and consisting of "subendocardial ecchymotic extravasations combined with bloody emphysema of the larger bronchi." Wood [3] adds nothing to Osler's description of the morbid anatomy.

1. Osler, William: The Principles and Practice of Medicine, ed. 10, New York, D. Appleton & Co., 1927.
2. Webster, R. W.: Legal Medicine and Toxicology, Philadelphia, W. B. Saunders Company, 1930.
3. Delafield and Prudden's Textbook of Pathology, revised by Francis Carter Wood, New York, William Wood & Co.

REPORT OF CASES

CASE 1.—C. O., a white man aged 45, a laborer, had been out of work for several months. September 15 he reported for work with a logging crew, working as a sawyer. By a coincidence this day was one of the hottest days of the year, averaging about 92 F. in the woods where the crew was working. At noon the man came to the mess shack but did not feel very well, said he was "sick to his stomach" and drank only a cup of coffee. Returning to work after the lunch rest, he worked more slowly than his partner until midafternoon, when he suddenly dropped his saw, began to shout and tear his hair, and then ran off into the woods. Pursued by his fellow workers he was returned to the camp "raving mad and so hot he sizzled," according to the foreman. On admission at the hospital his temperature was 105 F. and he was unconscious. Two hours later (about four hours after the acute onset), and without regaining consciousness, he died with a temperature of 107 by axilla. At the autopsy, three hours after death, a purpuric spot deep in the right axilla, and a series of similar spots over the back and midportion of the left arm, were observed. The chest contained approximately 150 cc. of bloody fluid in each pleural cavity and there was marked pulmonary congestion with bloody froth in the bronchi. The heart showed a massive subendocardial hemorrhage on the septal and posterior walls of the left ventricle extending up under the base of the mitral valve. There were petechial spots in both kidneys.

CASE 2.—I. T., a white man aged 62, had "fever therapy" in a doctor's office. This was his second such treatment. It was started at 10 a. m., and at 1 p. m. the temperature was 106 F. and the heat was discontinued. At 2 o'clock he was removed from the machine and at 5 o'clock the temperature was still 106 and the patient was unconscious. At 8 o'clock he was admitted to the hospital in a deep coma and he died shortly after midnight without regaining consciousness, with a terminal temperature of 106 F. by axilla. The autopsy gave essentially negative results except for cerebral edema and congestion, and subendocardial hemorrhages throughout the septal and posterior walls of the left ventricle.

CASE 3.—F. J., a white man aged 23, always previously well, had "fever therapy" for a gonorrheal urethritis. He had been removed from the cabinet and his temperature was down to 101 F. by mouth when it suddenly began to rise and in spite of constant ice packs the heat rose to 110 degrees by axilla and he died approximately three hours after the temperature began to rise. Autopsy showed petechial hemorrhages on the right side of the chest and small extravasations of blood throughout the pectoral muscles. There was a massive subendocardial hemorrhage in the left ventricle involving the septum and the posterior wall, extending through the thickness to the septum. There were also petechial hemorrhages in the brain stem and kidney.

CASE 4.—M. L., a white man aged 26, was given "fever therapy" for the third time in a doctor's office. After removal from the machine his temperature had dropped to 101 F. by mouth when he had a convulsion and his temperature began to rise. He was sent to the hospital and packed in ice but his temperature continued to rise and at death, four hours after the convulsion, the axillary heat was 108.6 F. Autopsy revealed congestion of the brain with extravasations of blood about the superior surface of the cerebellum and a subendocardial hemorrhage in the left ventricle, rather generalized, but most marked in the septum in the region of the bundle of His.

COMMENT

In four deaths from hyperpyrexia, one "natural" and three "fever therapy" cases, the same type of heart lesion was present and yet all four persons before the fatal illness were supposedly in "good health." The predominant feature of the clinical picture is the tremendous rise in body temperature, accompanied by unconsciousness, and both probably caused by cerebral edema and later by actual petechial hemorrhages in the brain.

The most striking, and probably the actually fatal, mechanism is a rather extensive hemorrhage under the endocardium of the left ventricle, especially on the septal wall in the region of the bundle of His. In none of these cases were seen the gastrointestinal hemorrhages reported by Chunn and Kirkpatrick.[4]

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DERMATITIS AMONG PLATE PRINTERS

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In a large printing establishment, a considerable percentage of plate printers had suffered for many years from recurrent cutaneous lesions of the hands and arms. So frequent were these lesions that the employees and the management requested an investigation not only because of the protests of the workers but also because of the financial loss due to compensation and time lost from work.

The establishment employs 1,058 workers, but most of the dermatitis occurred among the group of 318 plate printers and their forty-seven skilled helpers. This group of men lost thirteen man years of working time during the period of 1900-1936 at an estimated loss of $50,000 in lost time, not counting compensation, cost of medical treatment and the sufferings of the workers.

Among the other 693 workers no records could be found of any lost time from occupational dermatitis occurring during this period.

OCCUPATIONAL PROCESS

The engraved plates are covered with ink by press rollers and the plate printer wipes the excess ink from the plates by passing the bare hands rapidly over the plate. The ink that accumulates on the hands is wiped off on an apron. The apron is usually heavily crusted with dried ink from continued use, showing that it is but infrequently changed. In the interval between wiping off the plates, the plate printer cleans the ink from used plates with a piece of cloth saturated with gasoline which he holds in his bare hands. In these operations the hazards to the skin are not only from simple contact with the ink and gasoline but also from having the ink rubbed into the skin.

To clean the hands, which is done twice a day, the plate printers use a common sink containing a light nonirritant mineral oil in which the ink is soluble. The hands are wiped off with cheesecloth which is kept in the oil. Following this, soap and water are used to remove the oil from the hands. Many of the workers, in addition to the soap and water, use a stiff brush for scrubbing and some use potassium carbonate with the brush, while others use white sand and still others use all these cleaning agents. The abrasive action of these mechanical cleaners and the keratin solvent action of the potassium carbonate were no small factors in the etiology of the dermatitis. As proof of this, twenty-four rotary press printers who have some ink exposure but whose work does not entail wiping the ink off the plates and who did not use the brushes for cleaning the

4. Chunn, G. D., and Kirkpatrick, C. L.: Fatal Result of Artificial Fever Therapy, Mil. Surgeon 84:281 (Oct.) 1937.

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hands had no dermatitis at any time. In fact, when plate printers complained of stubborn cases of dermatitis they were often transferred to the rotary press printing job, where the dermatitis disappeared. On the other hand, among the forty-seven skilled helpers whose job it was to clean the ink buckets and fountains with gasoline there occurred three cases of dermatitis. These workers were exposed to more gasoline than were the plate printers but were less exposed to the inks, and they also used the same cleaning methods as were used by the plate printers.

Actual examination was made of 389 workers. The occupational history was taken to determine the workers' entire industrial experience, which disclosed that the majority of the plate printers, rotary press printers and skilled helpers had spent their entire working time at these occupations at their present place of employment and that all the employees who had dermatitis of the hands incurred this condition while working at this establishment. The shortest length of time after

of the physical examination. Four types of cutaneous lesions were found: 1. Chronic inflammation of the skin characterized by erythema and papules which developed into vesicles varying in size from a millet seed to a marble. The vesicles were easily ruptured, leaving denuded areas and forming crusts. Scaliness and fissures often followed this crusting and remained for a considerable time. Occasionally infection of a ruptured vesicle resulted in the formation of pustules and ulcers. New crops of vesicles appeared from time to time and some of the patients stated that they had had this condition of the hands for more than fifteen years. The dorsum and the interdigital spaces, the palms and the wrists of both hands were usually affected. However, in a few cases the lesions were restricted to the right hand. Sixteen of the twenty-one plate printers had dermatitis of this type. 2. The three skilled helpers, whose work it was to clean the ink fountains and buckets, and two plate printers had chronic dermatitis of the hands and wrists characterized by induration,

TABLE 1.—*Dermatophytosis of the Feet*

	Plate Printers				Rotary Press Printers				Skilled Helpers				Total		Patch Tests			
	Dermatitis of Hands at Present		No Dermatitis of the Hands		Dermatitis of Hands at Present		No Dermatitis of the Hands		Dermatitis of Hands at Present		No Dermatitis of the Hands				Positive		Negative	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Total number examined	21	....	264	....	0	..	22	....	3	....	43	....	354	....	13	....	92	....
Microscopic examination positive for pathogenic fungi of feet	7	33.3	91	34.5	0	0	8	34.8	1	33.3	9	20.9	116	32.8	5	38.5	28	34.1
Culture positive for pathogenic fungi of feet	6	28.6	71	26.9	0	0	5	21.7	1	33.3	10	23.3	93	26.3	5	38.5	21	25.6
Clinical evidence of dermatophytosis of feet	7	33.3	84	31.8	0	0	7	30.4	0	0	15	30.2	111	31.3	6	46.2	28	34.2
One or both microscopic or cultural examinations positive for pathogenic fungi of feet	8	38.1	100	37.9	0	0	8	34.8	1	33.3	12	27.9	129	36.4	5	38.5	29	35.4
Clinical evidence of dermatophytosis of feet, and either microscopic or cultural examinations or both positive for pathogenic fungi of feet	4	19.0	48	18.2	0	0	4	17.4	0	0	4	9.3	60	16.9	4	30.8	16	19.5
Clinical evidence of dermatophytosis of feet, but negative by microscopic and cultural examination	3	14.3	36	13.6	0	0	3	13.1	0	0	9	20.9	51	14.4	2	15.4	12	14.6
Either clinical evidence of dermatophytosis of feet or microscopic examination or cultural examination positive for pathogenic fungi of feet	11	52.4	136	51.5	0	0	11	47.8	1	33.3	21	48.8	180	50.8	7	53.8	41	50.0

Of the 316 plate printers, twenty-five had only an examination of the hands, and on eight no specimens for mycologic study were made.

employment that it took dermatitis to develop was eleven months and the longest about forty years. About one half the number of workers who had dermatitis had worked for ten years or more before they contracted it.

The past and present medical histories were taken in an attempt to tie up any allergic personal or family history with the susceptibility to the dermatitis, as well as in an effort to determine its origin and duration.

A history of familial allergy was about the same in all the groups examined, but it was found that a personal history of allergy was twice as frequent among those who had dermatitis as among those who had not. The season of the year played no role in the occurrence of the dermatitis. Thirty-eight per cent of the workers who were found to have dermatitis and 57 per cent of the workers who stated that they had had dermatitis lost no time from work because of their condition. The majority of the remaining affected employees lost from one week to two months' time from work as a result of their dermatitis.

The men were then stripped and examined for cutaneous lesions. Twenty-one plate printers and three skilled helpers had dermatitis of the hands at the time

roughness, dryness and wrinkling, accompanied by firmly adherent thin scales and no vesiculation. This type of lesion is characteristic of chronic dermatitis caused by long exposure of the skin to fat solvents. 3. One plate printer had a pustular perifolliculitis of the dorsum of the hands and plugging of the pores of the skin on the hands and forearms with numerous pit-like scars from healed areas of previous folliculitis. The dorsum of the hands and forearms of about 20 per cent of the plate printers showed enlarged pores plugged with dried ink. 4. Three plate printers had an eruption of the palms characterized by deep-seated vesicles, resembling dermatophytids. In addition, these men gave negative patch tests and had demonstrable fungous infections on other parts of the body.

Thirty-seven additional plate printers gave a history of having had dermatitis of the hands, which they considered due to their occupation. Three of these are now employed as rotary press printers and have had no dermatitis since that time.

In an effort to find what part fungous infections played in the etiology of the dermatitis occurring in this establishment, microscopic and culture examinations of material from the hands and feet of 354 of these

men were made. In this study a definite diagnosis of dermatophytosis was made only when pathogenic fungi could be demonstrated either by the microscope or by culture.

Pathogenic fungi were present in 129 cases (36.4 per cent). All the fungi were isolated from the feet—none from the hands. The lesions seen on the hands of the men did not resemble dermatophytoses. Moreover, there was no difference between the mycologic observations on the plate printers who had dermatitis on the hands and the mycologic observations on the other men examined who did not have dermatitis. Neither was there any difference in the frequency of occurrence of clinical evidence of dermatophytosis between these groups.

Patch tests were performed on 121 individuals, of whom eighteen were plate printers who had dermatitis of the hands at the time of examination. Thirty-three were plate printers who gave a history of dermatitis of the hands. As controls I used fifty plate printers who had been employed for ten years or longer and who had never had dermatitis of the hands, and twenty employees of the Industrial Hygiene Division of the National Institute of Health who never had known contact with any of the printing inks used. No positive reactions were obtained among the seventy controls given patch tests. Nine of the eighteen plate printers who had dermatitis at the time of examination gave positive reactions to the inks. Four of the thirty-three plate printers who gave a history of dermatitis of the hands gave positive reactions to the inks. Some of those who gave positive reactions reacted to more than one of the inks. Reactions were obtained only from orange, red, brown and yellow inks. The thirteen inks used in the patch tests were all of secret formulas and of complex composition, containing at least thirty coloring components in addition to various fillers, varnishes, oils and driers. I was informed that there are more than 1,000 different ingredients used in making these inks. Patch tests with the individual components of the inks could not be performed because their compositions are secret and therefore were not revealed to me.

Most of the dermatitis found in this establishment was undoubtedly of occupational origin, as is shown by the history and clinical appearance of the lesions and by the results of the patch tests. Dermatophytoses played but a small, if any, role in the etiology of these cases.

The actual causative agents were proved to be the inks and the cleaning materials used for the plates and for the skin.

The action of these irritants was augmented by mechanical trauma of the occupational process.

Hypersensitivity, acquired after exposure for a year or longer, was a factor in about 25 per cent of the cases; as was shown by the patch tests.

RECOMMENDATIONS

1. A complete preemployment examination should be made of plate printers by a physician who is aware of the hazards to the skin associated with these occupations.

2. Periodic medical examinations of plate printers should be made, particular attention being paid to the evidence of cutaneous diseases. Dermatitis of any employee should be carefully investigated and proper remedial measures instituted.

3. Workers handling cleaning fluids should, whenever possible, be required to wear rubber gloves with the sleeves buttoned down over the gloves in order to prevent the irritant chemicals from getting inside the gloves. Such rubber gloves should be made of synthetic rubber which is not easily affected by the volatile solvents.

4. Clean towels and clean aprons should be furnished to the workers daily.

5. The use of a common oil trough should be discontinued and some method should be instituted whereby each worker uses oil and cheesecloth not used by any one else.

6. The use of abrasive cleaning agents and strong alkalis should be prohibited. Only a good grade of liquid soap should be used.

7. Shower baths and wash rooms should be kept clean and scrubbed daily with soap and hot water.

8. Individual paper sandals should be furnished workers using the shower baths.

9. Separate lockers for work clothes and street clothes should be furnished plate printers to prevent soiling the street clothes with the inks and other substances capable of producing dermatitis.

National Institute of Health.

ABSTRACT OF DISCUSSION

DR. LOUIS SCHWARTZ, New York: Sometimes the reluctance of the managers of a company to reveal secret formulas may be overcome by asking them to put together groups of chemicals, not giving their names, for patch testing. For instance, all the dyes that went into the composition of the offending inks could have been mixed together without their names being divulged and the susceptible workers patch tested with the mixture to find out whether the dyes were the irritants. If a positive patch test resulted from this mixture of dyes, then the management could have been asked to divide the dyes into six groups of five dyes each, still not divulging the names of the dyes but only giving them numbers. Patch tests could then have been performed with the six groups of dyes and the group which gave the positive patch test would have been the one that contained the offending dye. The individual dyes in this group could then have been used for patch testing and the offending dye could have been identified by number and surely there could have been no objection from the management to give the name of the offending dye, provided the names of the ones that did not cause dermatitis were not mentioned. This would not have revealed a secret formula. The same procedure could have been followed with the various varnishes, oils, fillers and driers which went into the composition of the inks. It is inferred that removal to other jobs resulted in a cure of the dermatitis; but the paper also states that thirty-seven additional plate printers with a history of dermatitis no longer had it although they were still working at the job. This shows that these men had lost their hypersensitivity. I wish to emphasize that it is not advisable to remove employees with mild occupational dermatitis from their jobs before they are given a chance to get "hardened," as they call it. This losing of their hypersentitivity or developing an immunity actually happens in many cases if the man with dermatitis continues to work and gets well while on the job. In other words, continued exposure to a chemical sensitizes some workers, but most of those who thus become sensitized will become immune if they are allowed to continue to work. Of course, while working they should be given proper protective clothing as well as treatment for their condition. Only those should be taken off the job and transferred to other occupations who show that they cannot acquire this immunity. I would advocate that at least a month's trial at a job be allowed for those with mild involvement so as to give them a chance to become hardened.

A STUDY OF 2,400 ELECTROCARDIOGRAMS OF APPARENTLY HEALTHY MALES

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The chief hope of influencing favorably the mortality and morbidity of coronary heart disease rests with the earliest possible detection of its presence in an individual, as well as the elimination of predisposing factors. The only means available at present by which the presence of coronary disease can be detected before symptoms are present is by the electrocardiogram. Although one is not justified in attempting to diagnose heart disease from an electrocardiographic tracing alone, changes in the coronary circulation frequently occur which can be detected by electrocardiogram long before symptoms or signs become apparent. The extent to which disease must progress before symptoms become evident varies with individuals and is by no means constant. An exact relationship between the objective appearances in the electrocardiogram and the symptoms and progression of the disease has not been established.

A serial study of electrocardiograms in conjunction with the physical examination and an analysis of habits, occupation and diversions, beginning at a time when the coronary circulation is normal as judged by electrocardiographic appearances as well as subjective symptoms, and continuing at regular intervals through life, would be enlightening. By such means it might be possible to correlate habits, exercise, work and various physical factors with the onset and subsequent development of coronary heart disease. Such an investigation is now in progress.

This report is based on the study of 2,400 electrocardiograms taken as part of the periodic health examination of apparently healthy men. These were all policyholders with more than $25,000 of life insurance in force, who were allowed the privilege of this examination each year. They represent men from every state in the country, in both urban and rural communities. The average age of the entire group was 47.8 years.

TABLE 1.—*Symptoms Referable to the Heart in 2,400 Apparently Normal Males*

Complaint	Group 1 (811, 33.8%) No Abnormalities	Group 2 (1,239, 55.8%) Borderline Impairments	Group 3 (250, 10.4%) Definite Impairments
Pain around heart	1.7	4.0	5.2
Palpitation	0.9	1.0	2.8
Shortness of breath	1.4	1.7	3.2
Heartburn and pain in abdomen	2.8	2.7	1.6
Fear of heart disease	0.4	1.0	1.2
No symptoms	93.1	90.3	87.2

In this study the attempt to correlate habits and the results of physical examination with electrocardiographic changes has been made. Only the three conventional leads have been considered in the electrocardiogram.

The group of 2,400 has been divided into three classifications: first, those with normal electrocardiograms; second, those with borderline changes; and, third, those with definite impairments. We have considered borderline such electrocardiographic changes as low or iso-electric T_1 and T_2, left or right axis deviation, inverted or diphasic T_3, premature contractions, and depression of the RT segments of more than 1 mm. We have considered as definite impairments such changes as PR interval of more than 0.21 second, QRS interval more than 0.11 second, inverted or diphasic T_1, inverted or diphasic T_2, relatively deep Q_3, auricular fibrillation, or any combination of these. In group 1, that is, those which are normal, were found 33.8 per cent; in group 2, the borderline, 55.8 per cent; and in group 3, those with definite impairments, 10.4 per cent.

The various complaints of the individual at the time of examination were carefully noted and are listed in table 1. Among these were listed precordial distress of any kind, palpitation, dyspnea of even the slightest degree and abdominal pain. Also included among those with complaints was any person who mentioned that he was at all heart conscious or had any fear of heart disease. In group 1, 93.1 per cent had no complaints. In group 2, 90.3 per cent had no complaints. In group 3, 87.2 per cent had no complaints. It is to be remembered, however, that these people came for a periodic health examination and not necessarily because they were ill. It is interesting to note that only 12.8 per cent of those who had serious impairments gave any symptoms that could be at all referable to the heart.

TABLE 2.—*Percentage Incidence of Abnormalities and Habits of 2,400 Males, Grouped According to the Seriousness of Electrocardiographic Changes*

Complaint	Group 1 (811, 33.8%) No Abnormalities	Group 2 (1,239, 55.8%) Borderline Impairments	Group 3 (250, 10.4%) Definite Impairments
Weight			
Overweight 10% or more	24.5	48.7	46.4
Underweight 10% or more	6.9	2.0	1.6
Cardiac enlargement	1.0	3.0	9.2
Heart murmurs			
Systolic	4.8	6.0	10.4
Diastolic	0.1	0.1	1.6
Blood pressure			
Systolic 150 mm. or more	5.4	9.9	19.6
Diastolic 100 mm. or more	2.1	6.3	14.8
Occupation—executive	67.7	70.7	72.0
Habits			
Users of tea	26.0	31.6	36.8
Users of coffee	82.5	79.5	80.8
Users of alcohol	70.0	71.7	71.5
Recreation			
Sedentary hobbies	3.4	5.6	4.8
Moderate exercise	55.5	53.2	52.0
Strenuous exercise	16.0	11.6	8.8
History of heart disease in family	16.5	16.6	17.2
Average age	45.8	48.5	50.8

In table 2 is an attempted correlation of the various observations from the physical examination with electrocardiographic changes. The most significant factor noted was the prevalence of overweight in group 3. In group 1, 24.5 per cent were more than 10 per cent overweight, while in group 3, 46.4 per cent were overweight. In group 1, 6.9 per cent were underweight and, in group 3, 1.6 per cent were underweight. Thus, overweight is found approximately twice as frequently in group 3 as in group 1.

Enlargement of the heart as determined by palpation and percussion was found present in only 1 per cent of group 1 and 9.2 per cent of group 3. This is very striking.

Systolic murmurs were heard in 4.8 per cent of group 1 and 10.4 per cent of group 3, a very substantial increase.

From the records of the Life Extension Examiners.

The study of blood pressure seemed particularly significant. In group 1 there were 3.4 per cent who had a systolic pressure of more than 150 mm. In group 3 there were 19.6 per cent who had a systolic pressure of more than 150 mm. In group 1 there were 2.1 per cent who had a diastolic pressure of more than 100 mm. In group 3 there were 14.8 per cent who had a diastolic pressure greater than 100 mm. This indicates that hypertension was more than six times as prevalent in group 3 as in the normal group.

TABLE 3.—*Electrocardiographic Impairments in Various Blood Pressure Groups*

Diastolic Blood Pressure	(2,460) Number in Group	Group 1 (811, 33.0%) No Abnormalities	Group 2 (1,229, 50.0%) Borderline Impairments	Group 3 (250, 10.4%) Definite Impairments
Less than 70	395	65.6	41.6	11.8
From 70 to 79	818	40.0	52.4	7.6
From 80 to 89	829	32.0	58.3	9.8
From 90 to 99	309	19.1	69.9	11.0
100 or more	138	12.3	60.9	26.8

In order to throw further light on the relationship of blood pressure to electrocardiographic changes, the cases included in groups 1 and 3 were divided into those whose diastolic pressures fell between 70 and 80, 80 and 90, 90 and 100 and over 100 mm. This is shown in table 3. A very significant increase was noted in those who fell in group 3 as the diastolic pressures increased. Of those whose diastolic pressures were between 70 and 80 mm., 40 per cent were in group 1 and 7.6 per cent were in group 3; diastolic pressures 80 to 90 mm., 32 per cent were in group 1 and 9.8 per cent in group 3; diastolic pressures 90 to 100 mm., 19.1 per cent were in group 1 and 11 per cent in group 3; those with 100 mm. or more, 12.3 per cent were in group 1 and 26.8 per cent

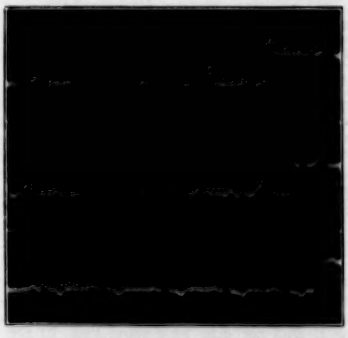

Fig. 1.—A man aged 48, a salesman; No subjective symptoms; negative physical examination. The electrocardiogram shows regular sinus rhythm and inversion of the T wave in the third lead. Q_3 is relatively deep.

were in group 3. Thus there is a steady increase from 7.6 per cent in group 3 for those with diastolic pressures between 70 and 80 mm. to 26.8 per cent for those having a diastolic pressure of more than 100 mm.

Occupation has always been considered a very important factor in the development of coronary heart disease. Unfortunately, this series is somewhat selective in that each person involved had more than $25,000 of life insurance and consequently few, if any, were of the laboring group. Of the total group 69.9 per cent were classed as executive. In group 1, 67.7 per cent were executive. In group 3, 72 per cent were executive.

In studying habits it was found that 26 per cent of group 1 were tea drinkers and 36.8 per cent of group 3 used tea; 82.5 per cent of group 1 were coffee drinkers and 80.8 per cent of group 3 were coffee drinkers; 76

Fig. 2.—A man aged 48, a manufacturer: No subjective symptoms; physical examination negative except for systolic hypertension (184/86). The electrocardiogram shows regular sinus rhythm, right axis deviation, notching and spreading of QRS. A definite tendency to low voltage of QRS also is shown.

per cent of group 1 used alcohol and 71.5 per cent of group 3 drank alcoholic beverages.

In studying recreation and exercise it was found that 5.4 per cent of group 1 were admittedly sedentary, 55.5 per cent did moderate exercising and 16 per cent did strenuous exercising. In group 3, 4.8 per cent were sedentary, 52 per cent moderate and 8.8 per cent strenuous. Again there were no significant differences.

TABLE 4.—*Percentage Incidence of Definite Electrocardiogram Impairments Among Smokers and Nonsmokers (812 Males)*

Condition	Nonsmokers (339)	Smokers (473)
Inverted or diphasic T_1 and T_2	0.3	0.8
Auricular fibrillation	0.3	...
PR interval 0.21 second or more	1.2	1.1
QRS duration 0.11 second or more	0.6	2.5
Low or iso-electric T_1 and T_2	1.5	2.1
Inverted or diphasic T_1	1.2	1.3
Inverted or diphasic T_2	...	0.8
Relatively deep Q_3	2.1	2.7
Low voltage QRS (less than 5 mm.)	0.9	1.3
Total with definite impairments	7.4	11.6

The effect of smoking on either the development or the course of coronary heart disease has been much discussed for many years. In order to throw some more light on this problem two groups were taken from the series: those who had never used tobacco and those who admitted to smoking continuously for more than ten years. The results are presented in table 4. There were 339 nonsmokers and 473 who had smoked for more than ten years. Of the nonsmokers 7.4 per cent were found in group 3. Of those who had smoked for more than ten years there were found 11.6 per cent in group 3. Thus there is approximately a 50 per cent increase in the incidence of definitely abnormal electrocardiographic changes in the smoker as compared with the nonsmoker. This becomes more striking since the nonsmokers were an older group whose average age

was 48.5 as compared with 47 years for the smokers, and the incidence of overweight was slightly higher in the nonsmoking group. The most striking abnormality noted in studying these two groups was an increased QRS duration. We found this to be increased more than four times as often in the smokers as in the nonsmokers. This comparison of smokers and nonsmokers would seem to indicate that smoking does play some part in the subsequent development of abnormal electrocardiographic changes.

With regard to the history of heart disease in either father or mother, 16.5 per cent of group 1 gave a positive history and 17.2 per cent of group 3 gave a similar history. From this study a history of heart disease in either father or mother had little influence on the incidence of electrocardiographic observations.

SUMMARY

1. In conjunction with physical examinations, complaints and habits, 2,400 electrocardiograms were studied. Of these 33.8 per cent were normal, 55.8 per cent were borderline and 10.4 per cent were definitely abnormal.

2. In the abnormal group 87.2 per cent were entirely symptom free.

3. Overweight was found to be twice as frequent in the abnormal group as in the normal group.

4. Enlargement of the heart was found to be nine times as frequent in the abnormal group.

5. Systolic murmurs were found twice as frequently in the abnormal group.

6. Systolic hypertension was found six times as frequently in the abnormal group.

7. Diastolic hypertension was found seven times as frequently in the abnormal group.

Fig. 3.—A man aged 46, an executive: No subjective symptoms; negative physical examination. The electrocardiogram shows regular sinus rhythm and low voltage of QRS. Q_3 is prominent and T_3 slightly inverted.

8. There was no significant difference between the two groups so far as habits of tea drinking, coffee drinking or alcohol consumption was concerned.

9. There was a 50 per cent increase in abnormal electrocardiographic observations among the group of smokers as compared with the nonsmokers.

10. With regard to the parental history of heart disease there was no significant difference between the two groups.

11 East Forty-Fourth Street.

COMPENSATION FOR INDUSTRIAL INJURIES AND OCCUPATIONAL DISEASES

SOME LEGAL AND MEDICOLEGAL ASPECTS

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The legal and medicolegal aspects of laws, state and federal, providing compensation for industrial injuries and occupational diseases are of great importance to physicians because of the broad scope and rapid expansion of industrial medicine as a phase of medical practice. Obviously, not all of the innumerable legal and medicolegal aspects of these laws can be presented here. A few of particular interest to the medical profession will be discussed.

COMPENSABILITY OF INDUSTRIAL INJURIES

The first comprehensive national scheme for providing compensation to injured workmen was established in Germany in 1884. It was not until 1902 that a workmen's compensation law was enacted in this country. In that year Maryland enacted such a law, which applied only to certain occupations, but it was later declared unconstitutional. In 1908 a federal compensation law, applicable only to the relatively few employees of the United States government engaged in hazardous occupations, was enacted and became effective August 1 of that year. Since that time all of the forty-eight states except Mississippi and Arkansas have enacted and placed in operation laws providing compensation to workmen for industrial injuries. In Arkansas a compensation law has been enacted, but its operation is suspended pending the outcome of a referendum which will be held in November 1940. In addition to state laws there are also federal compensation laws which apply to designated groups, such as civil employees of the United States government, longshoremen and harbor workers, workmen in the District of Columbia, and others. The federal government has also enacted workmen's compensation laws for Alaska, Hawaii and Puerto Rico.

Workmen's compensation laws may be compulsory or elective as to all employments covered or they may be compulsory as to some occupations and elective as to others. Compensation is compulsory for all or some private employments covered by the workmen's compensation acts in eighteen states and the District of Columbia and compulsory for all or some public employments covered in thirty-one states and the District of Columbia.[1] Compensation is elective as to all private employments affected in twenty-nine states and elective as to all public employments covered in fourteen states.[2] Where the right of election exists, it is commonly provided that if no election is made the three common law defenses are no longer available to the employer, namely assumption of risk, contributory negligence and the fellow-servant doctrine.

Workmen's compensation acts are commonly administered by agencies variously designated as workmen's compensation boards, commissions, bureaus, departments or commissioners. In Alaska and in six states, Alabama, Louisiana, New Hampshire, New Mexico,

From the Bureau of Legal Medicine and Legislation, American Medical Association.

1. Digest of Workmen's Compensation Laws of the United States and Territories, ed. 16, Association of Casualty and Surety Executives, 60 John Street, New York, 1939, p. 9.

2. Digest of Workmen's Compensation Laws, p. 10.

Tennessee and Wyoming, the laws are administered by courts, but even in these jurisdictions the operations of the laws are to some extent supervised or administered by designated administrative officials. In Connecticut there is a single commissioner in and for each of five autonomous districts. The workmen's compensation act of New York in some respects is administered by a single commissioner but in other respects it is carried out by an industrial board. Presumably hearings before the various administrative agencies or boards were designed to be simple and informal, but actually in many jurisdictions today there is little difference between a controversy before such an agency and litigation before a court of law. The determinations of these administrative agencies are not final but may be appealed to the courts. However, the findings of these boards as to facts, if such are sufficient in law, are final.

The scope of laws providing compensation for industrial injuries differs so widely that it is well nigh hopeless to attempt classification. Some of these laws apply to all employments in which more than a designated number of workers, varying from two to sixteen, are employed. Other acts apply primarily or unqualifiedly only to certain stated hazardous or extrahazardous employments. Agricultural employments and domestic service are commonly exempted. Often it is provided that exempted employments may be brought under the act by election. In at least five states, Arkansas, California, Georgia, Idaho and New York, charitable organizations also are exempted. A waiting period after injury, varying from three days to two weeks, during which compensation is not to be paid, is usually provided.

TABLE 1.—*Compensability of Occupational Diseases*

State or Federal Law	Covered by Special Occupational Disease Acts [1, 2]	Application of Law: Compulsory	Application of Law: Elective	Specific Coverage: Occupational Diseases Specifically Described or Scheduled	Blanket Coverage: Occupational Diseases Defined in General Terms	Blanket Coverage: Occupational Diseases Essentially Undefined	Silicosis: Specifically Covered [3]	Silicosis: Covered Under General Language [4]	Silicosis: Definitely Excluded
Arkansas [5]	..	+	..	+	..	..	+	..	..
California	..	+	..	..	..	+[6]	..	+[6]	..
Connecticut	..	..	+	..	+	..	..	+	..
Delaware	..	..	+	+	..	..	..	..	+
District of Columbia	..	+	..	..	..	+[6]	..	+[6]	..
Idaho	+	+	..	+	..	..	+	..	..
Illinois	+	..	+	..	+	..	+	..	..
Indiana	+	..	+	+	..	..	+	..	..
Kentucky	..	..	+	+[7]	..	..	+	..	..
Maryland	..	+	..	+	..	..	+	..	..
Massachusetts	..	..	+	..	..	+[8]	+	..	..
Michigan	..	..	+	+	..	..	+[9]	..	..
Minnesota	..	+	..	+	..	..	..	..	+
Missouri	..	..	+	..	..	+[9]	..	+[9]	..
Nebraska	..	..	+	+[10]	..	..	..	+[11]	..
New Jersey	..	..	+	+	..	..	..	..	+
New York	..	+	..	+[12]	..	+[12]	+	..	..
North Carolina	..	..	+	+	..	..	+	..	..
North Dakota	..	+	..	..	..	+[13]	..	+[13]	..
Ohio	..	+	..	+[14]	+[14]	..	+	..	..
Pennsylvania	+	..	+	+	..	..	+	..	..
Rhode Island	..	..	+	+	..	..	..	..	+
Washington	..	+	..	+	..	..	+	..	..
West Virginia	..	..	+	+[7]	..	..	+	..	..
Wisconsin	..	+	..	..	..	+[15]	+	..	..
Longshoremen's and harbor workers' compensation act	..	+	..	..	..	+[6]	..	+[6]	..
Compensation act for civil employees of United States	..	+	..	..	..	+[16]	..	+[16]	..

Table is based on data in table entitled "Occupational Diseases Covered," Digest of Workmen's Compensation Laws of the United States and Territories, ed. 16, Association of Casualty and Surety Executives, 60 John Street, New York, 1939, page 14; Chart V, "Workmen's Compensation: Occupational Disease," as of Jan. 1, 1938, Division of Labor Statistics, U. S. Department of Labor; and data in files of Bureau of Legal Medicine and Legislation, American Medical Association.

1. Operation of law, enacted by state legislature providing compensation for industrial injuries and occupational diseases, is suspended pending outcome of referendum.
2. In these four states, occupational diseases are compensable under occupational disease acts separate from workmen's compensation acts. Other than in these four states, the data presented in this table relate to workmen's compensation acts or amendments to such acts.
3. Many of the laws which are designated as specifically providing compensation for silicosis also provide compensation for other occupational dust diseases, such as asbestosis and pneumoconiosis.
4. Laws which provide compensation for occupational diseases but do not specifically mention silicosis may also be considered as providing compensation for silicosis and other occupational dust diseases.
5. Law covers "injuries," inclusive of diseases undefined.
6. Law covers "occupational disease or infection" undefined, arising naturally out of employment or resulting from accidental injury.
7. Only occupational disease covered is silicosis. The Kentucky law covers only silicosis in employees engaged in glass manufacturing, quarries and sand mines or in manufacturing, treating or handling sand.
8. Law covers silicosis in mining only.
9. Law covers occupational diseases undefined, subject to joint election of employer and employee.
10. Only occupational diseases covered are those in smelting, metal refining and battery manufacturing industries.
11. Law can be considered as covering only silicosis if it occurs in certain industries. See footnote 10.
12. Law contains a schedule but with an additional paragraph covering "any and all occupational diseases" undefined. The New York Court of Appeals in Goldberg v. 864 Marcy Corporation (N. Y.), 12 N. E. (2d) 311 defined what is meant by "any and all occupational diseases."
13. Law covers any disease "approximately" cause by employment.
14. Law contains a schedule but with an additional paragraph covering "all other occupational diseases" in general terms.
15. Law covers "harm" caused by accident or disease.
16. Law covers disease proximately caused by or resulting from nature of employment.

In addition, occupational diseases specifically described or scheduled are compensable in Puerto Rico and occupational diseases undefined are compensable in Hawaii.

What conditions are compensable, that is, what constitutes a compensable industrial injury or accidental injury, will depend on the language of the workmen's compensation law in each particular jurisdiction. The majority of these laws by their terms require that the injury be accidental, that is, unexpected or unforeseen. There is a tendency, however, by amendment of the acts or by court interpretation not to require that the injury be accidental to be compensable. In most of the states the act covers only injuries "arising out of *and* in the course of" employment; in a few states, North Dakota, Pennsylvania, Texas and Washington, the law covers injuries incurred "in the course of" employment, and in

Utah the law covers injuries "arising out of *or* in the course of" employment. The acts of California, Iowa and Massachusetts cover "injuries," the term being not defined. The Wisconsin act covers mental or physical harm caused by accident or disease. The North Dakota act covers injuries by accident and any disease "approximately caused by" employment. In a few states, as in Pennsylvania and Texas, a compensable injury is defined to mean damage or harm to the physical structure of the body and such diseases or infection as naturally result therefrom. Even in the absence of such a definition, under most of the acts compensation is allowed for such diseases as naturally follow from an industrial injury. Aggravation of a preexisting disease by injury is usually considered an industrial injury and not an occupational disease. In Connecticut and Florida disability or death due to the aggravation or the acceleration of venereal diseases is not compensable.

Courts have not infrequently allowed compensation, under workmen's compensation acts which make industrial injuries compensable, for conditions, such as lead poisoning, which actually are "occupational diseases." The laws in twenty-five states contain special provisions relating to hernia. A workman suffering from a hernia is required in some states to submit to surgical repair. In many of these twenty-five states the laws specifically define what constitutes a compensable hernia. In Michigan and Rhode Island a hernia sustained in the course of employment is not an accidental injury but is compensable as an occupational disease. In nine states the acts contain special provisions relating to malpractice by attending physicians.

COMPENSABILITY OF OCCUPATIONAL DISEASES

Just as a workman should receive compensation for an injury which he sustains in the course of his employment, to compensate him in some way for his loss, so also should a workman receive compensation for a disease which he contracts as the result of conditions of his employment. More and more jurisdictions are enacting laws which provide compensation for occupational diseases. Today, twenty-four states provide compensation for such diseases. The federal government also allows compensation for such diseases in the District of Columbia and under its compensation laws relating to longshoremen and harbor workers and civil employees of the United States.

As in the case of industrial injuries, compensation for occupational diseases may be compulsory or elective. Likewise the federal laws and most of the state laws providing compensation for occupational diseases are administered by boards, commissions, bureaus, departments or commissioners. In Connecticut there is a single commissioner in and for each of five autonomous districts. In New York the law in some respects is administered by a single commissioner but in other respects by an industrial board. The determinations of these administrative agencies are not final and are always appealable to the courts.

TABLE 2.—*Limitations in Time and Cost of Medical and Hospital Benefits in Compensable Industrial Injuries*

State or Federal Law	Maximum Period	Maximum Cost
Alabama	90 days [1]	$250
Alaska	1 year	Unlimited [2]
Arizona	Unlimited	Unlimited [2]
Arkansas [4]	60 days [3]	Unlimited
California	Unlimited	Unlimited
Colorado	4 months [7]	$500
Connecticut	Unlimited	Unlimited
Delaware	30 days [3]	$150 [9]
District of Columbia	Unlimited	Unlimited
Florida	Unlimited	$250 [6]
Georgia	10 weeks [3]	$500
Hawaii	Unlimited	Unlimited
Idaho	Reasonable time	Unlimited
Illinois	Unlimited	Unlimited
Indiana	90 days [3]	Unlimited
Iowa	Unlimited	Unlimited
Kansas	60 days	$100 [9]
Kentucky	90 days [3]	$200 [9]
Louisiana	Unlimited	$250
Maine	30 days [3]	$100 [9]
Maryland	Unlimited	$500
Massachusetts	2 weeks [3]	Unlimited
Michigan	90 days	Unlimited
Minnesota	Unlimited	Unlimited
Missouri	90 days [3]	$750
Montana	6 months	$500 [17]
Nebraska	Unlimited	Unlimited
Nevada	6 months [3]	Unlimited [2]
New Hampshire	30 days	Unlimited
New Jersey	Unlimited	$100 [9]
New Mexico	Unlimited	$400
New York [5]	Unlimited	Unlimited
North Carolina	10 weeks [3]	Unlimited [9]
North Dakota	During disability	Unlimited
Ohio	Unlimited	$250 [3]
Oklahoma	60 days [3]	Unlimited
Oregon	Unlimited	$250 [3]
Pennsylvania	5 months	$200 [9]
Philippine Islands	Unlimited	Unlimited
Puerto Rico	Unlimited	Unlimited
Rhode Island	Unlimited	$250 [16]
South Carolina	10 weeks [3]	Unlimited
South Dakota	30 weeks	$300
Tennessee	30 days [3]	$200
Texas	90 days [11]	Unlimited
Utah	Unlimited	$500 [3]
Vermont	2 weeks	$50 [12]
Virginia	60 days [13]	Unlimited
Washington	During disability [14, 3]	Unlimited
West Virginia	Unlimited	$400
Wisconsin	Compensable period [15]	Unlimited
Wyoming	Unlimited	$300 [10]
Longshoremen's and harbor workers' compensation act	Unlimited	Unlimited
Compensation act for civil employees of United States	Unlimited	Unlimited

Table is based on data in table 7, "Maximum Periods and Amounts of Medical Service, by States," Monthly Labor Review, vol. 47, p. 580, September 1938, supplemented by data in files of Bureau of Legal Medicine and Legislation, American Medical Association.

1. Additional service may be given at option of employer.
2. Employee contributes.
3. Additional service in special cases or at discretion of commission.
4. Operation of law, enacted by state legislature providing compensation for industrial injuries and occupational diseases, is suspended pending outcome of referendum.
5. In case of disability resulting from inhalation of harmful dust, period of treatment is limited to 270 days.
6. Medical or other treatment for asbestosis or silicosis shall be limited to three years and a maximum cost of $234 a year.
7. In case of hernia, if employee requires operation he is entitled to service without limitation of time.
8. In surgical cases maximum may be increased by order of commission to $500.
9. Amount is exclusive of hospital treatment and artificial appliances.
10. In case of employee receiving hospital treatment for more than fourteen days, the maximum is $250.
11. Hospital services may be extended for an additional two weeks on certification of attending physician as to necessity.
12. Also hospital first thirty days, maximum $150.
13. Extended in unusual cases. Not to exceed 180 days.
14. In case of temporary disability, continues not longer than period of compensation, and in case of permanent disability not beyond the date of award. Employees contribute.
15. Interpreted as unlimited by Wisconsin industrial commission.
16. Additional expenditure of not more than $150 for medical service and $150 for hospital treatment may be authorized by court.
17. A special operating fee of $100 allowed in case of hernia.

In four states, Idaho, Illinois, Indiana and Pennsylvania, occupational diseases are made compensable under special occupational disease acts which are separate and apart from the workmen's compensation acts of those states. In all of the other jurisdictions which provide compensation for occupational diseases, compensation is based on statutory provisions in workmen's compensation acts or judicial interpretation of such acts. Detailed information relative to the compensability of occupational diseases is set forth in table 1.

An examination of table 1 reveals that fourteen states provide compensation for occupational diseases by specifically describing or enumerating in a schedule the diseases that are covered. Such a schedule may be composed of only a few diseases or it may consist of a large number. In two more states, New York and Ohio, the laws cover a schedule of diseases and "any and all occupational diseases" or "all other occupational diseases" respectively. In all other jurisdictions in which occupational diseases are compensable, including eight states and the District of Columbia, the law covers "occupational diseases" in a general or blanket manner either by defining "occupational disease" in general terms or, for all practical purposes, not defining it at all. In some of the states only occupational diseases occurring in certain designated industries are covered. Most of the laws providing compensation for occupational diseases, either by specific or by general language, may be said also to allow compensation for silicosis and, in many instances, other occupational dust diseases.

To define an occupational disease has proved most difficult. Where a schedule is resorted to, obviously the list of diseases adopted is not likely to be all inclusive and so revisions from time to time will become necessary. One of the better attempts to define an "occupational disease" in general terms is that to be found in the definition of that term in the Illinois occupational disease act, which is as follows:

> In this Act the term "Occupational Disease" means a disease arising out of and in the course of the employment. Ordinary diseases of life to which the general public is exposed outside of the employment shall not be compensable, except where the said diseases follow as an incident of an occupational disease as defined in this section.
>
> A disease shall be deemed to arise out of the employment, only if there is apparent to the rational mind upon consideration of all the circumstances, a direct causal connection between the conditions under which the work is performed and the occupational disease, and which can be seen to have followed as a natural incident of the work as a result of the exposure occasioned by the nature of the employment and which can be fairly traced to the employment as the proximate cause, and which does not come from a hazard to which workmen would have been equally exposed outside of the employment. The disease must be incidental to the character of the business and not independent of the relation of employer and employee. The disease need not to have been foreseen or expected but after its contraction it must appear to have had its origin in a risk connected with the employment and to have flowed from that source as a rational consequence.[3]

This definition was incorporated in the occupational disease act of Indiana. The statutory definitions of "occupational disease" at best are none too clear. If no attempt is made in the law to provide a schedule of diseases or to define an "occupational disease," then it is up to the courts to define what is meant by that phrase. Here again the results have been none too satisfactory. Consequently there is today in many of the states no clearcut legal distinction between "occupational diseases" and "industrial injuries."

3. Smith-Hurd Illinois Annotated Statutes, 1939, ch. 48, sec. 172.6.

MEDICAL AND HOSPITAL BENEFITS

Medical and hospital services which employers or their insurance carriers are required to furnish to industrially injured or occupationally diseased employees constitute the most significant phase of compensation. It is estimated that three fourths of industrial injuries do not involve disability over a sufficiently long period to require cash compensation but that most of these require medical attention and perhaps hospitalization.

All of the laws which provide compensation for industrial injuries or occupational diseases require the employer, or his insurance carrier, to furnish or be financially responsible for, frequently within certain limitations, necessary medical and hospital services to industrially injured or diseased workmen. Most of these laws fix certain maximum limitations, as to time or to cost or to both, beyond which medical or hospital services need not be furnished by the employer or his insurance carrier. A minority of these laws, however, impose no maximum limitation as to either time or cost. While the law may not impose specific limitations and so the medical and hospital care which the employer or his insurance carrier must furnish may be said to be "unlimited," yet such services are subject to this limitation that they must be reasonable, that is, only such as the nature of the injury or condition reasonably requires. In some of the laws, as in Arizona and North Dakota, a limitation of reasonableness is specifically provided. In a few states medical and hospital benefits are limited to the period of disability or period of compensation. Even where limitations exist, commonly provision is made for the administrative agency to remove the limitations, at least in individual cases or unusual cases, and order further treatment or hospitalization either without limit or not beyond an additional limit set forth in the statute.

The maximum limitations imposed as to medical and hospital benefits in compensable industrial injuries are set forth in table 2. There is a definite tendency, especially in recent years, for legislatures to liberalize the provisions in workmen's compensation laws relating to medical and hospital benefits either by abolishing limitations as to time or to cost or to both or by raising the maximum limitation or limitations provided.

The maximum limitations imposed on medical and hospital services which employers or their insurance carriers are required to furnish in compensable occupational diseases are presented in table 3. In three states, Illinois, New York and North Carolina, limitations as to time or cost or both apply only to cases of silicosis or other occupational dust diseases.

FREE CHOICE OF PHYSICIAN

Under the earliest workmen's compensation acts, free choice of physician by an injured workman, except at his own cost, was seldom permitted. In later years there has been a trend toward free choice both in statutory amendments and in administrative practice. In spite of this trend, under federal compensation laws and the laws of most states the employer or insurance carrier or insurance fund still has the right to choose the physician or hospital. In such jurisdictions the industrially injured or occupationally sick worker, if he

desires to be treated free of cost to himself, must accept the physician, hospital or nurse, regardless of competence, tendered by the employer or the employer's insurer. In an emergency, however, the workman may choose his own physician or hospital. Of course, the worker may always choose his physician without cost to himself whenever the employer or his insurance carrier refuses, on demand, to furnish necessary medical or hospital services. The employee may always be treated by a physician of his own choosing at his own expense, but that can hardly be said to be any free choice of physician. In such jurisdictions the employers or insurance carriers may of their own initiative prepare panels of physicians from which the employee may select a physician.

According to the files of the Bureau of Legal Medicine and Legislation, the employee has the right to select a physician of his own choice in comparatively few of the states. In Massachusetts and Rhode Island the worker has the right unconditionally to select a physician of his own choosing. In Minnesota the workmen's compensation act has been construed to permit the worker to select his own physician, although the language of the act is similar to that of other state acts which have been construed as denying free choice. In Utah the law provides that the employee may select his own physician, unless the employer has arranged for medical services by contract and has posted such contract in and about the premises where the workman is employed. This act has also been construed to give the worker the right of selection. In North Carolina and Vermont the employee may select a physician of his own choosing subject to the approval of the workmen's compensation board. In three states, Wisconsin, California and New York, the worker may select his physician from a panel or list of physicians. In Wisconsin the employee has the right to select his physician from a panel prepared and posted by the employer. In California the law requires the employer to tender the employee on his request one change of physicians and to nominate at least three additional competent physicians, or as many as may be available if three cannot reasonably be named, from whom the employee may choose. Also the employee is entitled, on request, to a consulting physician to be provided by the employer in any serious case. In New York the employee may select his physician from a panel or list of physicians, approved and authorized by the state industrial board to render medical care to injured or sick workmen. However, the industrial commissioner is required, on the recommendation of any county medical society or of a board representing physicians of any other school of medical practice, to authorize physicians licensed to practice medicine in the state to render such medical care. The New York law thus almost entirely places on the local medical societies the responsibility for the quality of medical care. In Connecticut and Nebraska, while the employer has the right to designate the physician in the first instance, in all cases involving dismemberment or a major surgical operation the employee may designate the operating surgeon. A workman in Pennsylvania, after petition to the workmen's compensation board and notice to his employer, may consult a physician of his own choice at any time during his disability, the cost of such consultation to be paid by the employer in accordance with the schedule of charges prescribed and approved by the board. Although it is possible that administrative boards in a few states, by administrative ruling, may permit employees to select physicians of their own choosing, no discussion of such administrative practice will be presented here.

The right of an industrially injured or occupationally sick workman to choose the physician who shall treat him is a highly controversial subject. The real question involved is How can competent medical service best be obtained? It is a fundamental principle of medical ethics that the patient, if he is to have adequate medical care, shall have free choice in selecting his physician. The argument sometimes advanced that a workman is unable to make a good choice of a physician to treat him, while perhaps true in some cases, overlooks the fact that the workman's vital interest in the preservation of his health and earning capacity and prolongation of his life is a supreme inducement to a wise choice of an attending physician. The contention that employers are better able to judge the qualifications of physicians than are their employees might have some force were all employers conscientious, high minded and well meaning persons interested in the welfare of their employees and experienced in selecting competent physicians. While it is probably true that during the last ten or twenty years many employers have swung from cheap inadequate medical service to good medical service, no matter what the cost, because they have learned that cheap medical service in the long run is

TABLE 3.—*Limitations in Time and Cost of Medical and Hospital Benefits in Compensable Occupational Diseases*

State or Federal Law	Maximum Period	Maximum Cost
Arkansas [1]	90 days [2]	Unlimited
California	Unlimited	Unlimited
Connecticut	Unlimited	Unlimited
Delaware	30 days	$150
District of Columbia	Unlimited	Unlimited
Idaho	90 days [2]	Unlimited
Illinois	6 months [3]	Unlimited
Indiana	30 days [4]	Unlimited
Kentucky	90 days [5]	$300 [6]
Maryland	Unlimited	$300 [6]
Massachusetts	14 days [7]	Unlimited
Michigan	90 days	Unlimited
Minnesota	Unlimited	Unlimited
Missouri	90 days [8]	$150 [8]
Nebraska	Unlimited	Unlimited
New Jersey	Unlimited	$50; medical;[9] $50; hospital [9]
New York	270 days [8]	Unlimited
North Carolina	3 years [8]	$234 a year [8]
North Dakota	Unlimited	Unlimited
Ohio	Unlimited	$200 [7]
Pennsylvania	60 days; medical; unlimited; hospital	$150, medical; unlimited; hospital
Rhode Island	Unlimited	$200 or $250 [10]
Washington	Compensable period [8]	Unlimited
West Virginia	Unlimited	$600 [11]
Wisconsin	Compensable period [12]	Unlimited
Longshoremen's and harbor workers' compensation act	Unlimited	Unlimited
Compensation act for civil employees of U. S.	Unlimited	Unlimited

Table is based on data in chart V, "Workmen's Compensation: Occupational Disease," and chart VI, "Workmen's Compensation: Silicosis," as of Jan. 1, 1938, Division of Labor Statistics, U. S. Department of Labor, supplemented by data in files of Bureau of Legal Medicine and Legislation, American Medical Association.

1. Operation of law, enacted by state legislature providing compensation for industrial injuries and occupational diseases, is suspended pending outcome of referendum.
2. May be extended to 180 days.
3. Limitation applies only to dust diseases.
4. May be extended to sixty days.
5. May be increased to $400.
6. Probably limited to this amount as in the case of accidental injuries.
7. May be extended in unusual cases.
8. May be extended.
9. May be increased.
10. Depending on length of hospitalization.
11. May be increased to $1,600.
12. Interpreted as "unlimited" by Wisconsin industrial commission.

expensive medical service, it must be remembered that compensation laws apply to all types of employers and to industries in the sparsely populated areas as well as in the metropolitan centers. Also the majority of industries depend on insurance companies to supply the medical and hospital care required. An employer interested in the welfare of his workmen should realize that, where employees are allowed to choose between the medical service established by the employer in his plant and the medical service obtainable elsewhere, a healthy competition is stimulated between his own physicians and those on the outside. It should not be overlooked that absolute denial to the employee of the right to choose his own physician in that respect reduces the workman to the status of a machine or puppet in the hands of the employer or the employer's insurer. No injured workman should be denied the right to be treated by a physician of his own choice if he so desires.

TABLE 4.—*Determination of Medical Matters Under Laws Providing Compensation for Occupational Diseases*

State or Federal Law	No Provision	Provision for Medical Board	Other Provisions
Arkansas [1]	..	Medical board of 3 members; findings advisory	
California	..		Commission may appoint special examiners; findings advisory
Connecticut	+		
Delaware	+		
District of Columbia	+		
Idaho	..	Medical panel of 6 members for silicosis and of 3 members for other diseases; appointed by industrial accident board; findings advisory	
Illinois	..		Commission may appoint special examiners; findings advisory
Indiana	..		Industrial board may appoint examiners or other experts
Kentucky	..		Compensation board may, and on application shall, appoint 2 to 3 examiners in silicosis
Maryland	..	Medical board of 3 members; findings advisory	
Massachusetts	..	Medical board of 3 medical referees; diagnosis binding	
Michigan	..		In disputed cases department may appoint 3 impartial physicians; majority decision final
Minnesota	..		Commission may appoint special examiners
Missouri	..		Commission may order medical examinations
Nebraska	+		
New Jersey	+		
New York	..	Medical board of 3 members for dust diseases; findings advisory	
North Carolina	..	Medical board or committee of 3 members; findings advisory; supervise periodic examinations for exposure to dust diseases	
North Dakota	..		Compensation bureau may appoint special examiners
Ohio	..	Medical boards of review; findings binding on commission; 3 silicosis referees; findings advisory	
Pennsylvania	..	Medical board of 3 members selected by secretary of labor and industry with approval of governor; findings advisory	
Rhode Island	..		Director of labor shall appoint special examiners
Washington	..		Department may require examination
West Virginia	..	Medical board of 3 members appointed by commissioner; findings advisory	
Wisconsin	..		Commission may appoint examiners
Longshoremen's and harbor workers' compensation act	+		
Compensation act for civil employees of U. S.	+		

Table is based on data in chart V, "Workmen's Compensation: Occupational Disease," as of Jan. 1, 1938, Division of Labor Statistics, U. S. Department of Labor, supplemented by data in files of Bureau of Legal Medicine and Legislation, American Medical Association.

1. Operation of law, enacted by state legislature providing compensation for industrial injuries and occupational diseases, is suspended pending outcome of referendum.

ROLE OF PHYSICIANS IN ADMINISTRATION OF COMPENSATION LAWS

An agency administering laws providing compensation for industrial injuries or occupational diseases or both can hardly competently or efficiently make determinations involving medical aspects of compensation without representation on such administrative boards of doctors of medicine or without the aid of a medical board, medical advisers, medical consultants or impartial medical examiners. And yet many such agencies do just that. There should be medical representation proportionate to the medical interests involved, because questions of a purely medical nature should be passed on by those who have met the standards of medical qualifications required by law and who alone have been pronounced capable of passing on such questions.[4]

According to Marshall Dawson,[5] of the Bureau of Labor Statistics of the U. S. Department of Labor, as of Jan. 1, 1938, in twenty-one states the workmen's compensation authority had a medical staff, but with full-time officers in only eight instances. He further states that most of the industrial commissions, in case of medical dispute or apparent prejudice, have authority to select an independent physician to examine the worker, but in several instances commissions reported lack of funds to pay for examinations which they did not consider properly chargeable to the employer or insurance carrier. The methods provided for the determination of medical matters under laws providing compensation for occupational diseases are discussed in table 4.

REPORTING OF INDUSTRIAL INJURIES AND OCCUPATIONAL DISEASES

Laws providing compensation for industrial injuries and occupational diseases often specifically impose on physicians treating industrially injured or occupationally diseased workmen the duty to render reports, usually on forms provided for that purpose, to the

4. Medical Relations Under Workmen's Compensation, Revised; A Report prepared by the Bureau of Medical Economics, American Medical Association, Chicago, 1935, ch. IX, p. 144.

5. Bureau of Labor Statistics Serial No. R. 867: Medical Aid Under Workmen's Compensation Laws, United States Government Printing Office, Washington, D. C., 1939, p. 16.

workmen's compensation board or other administrative agency or to the employer or to both. Under some circumstances, physicians may be required by compensation laws to render reports to injured or sick employees. Aside from compensation laws, physicians are not infrequently required, by laws primarily relating to reporting of communicable diseases, to report occupational diseases to state boards or departments of health. Also the compensation laws of a large number of states require employers to report industrial injuries and occupational diseases to the workmen's compensation board or other administrative agency. Because the employer in rendering such reports must rely on physicians for details of injury and disease, it is not unlikely that the employer, by contract of employment or otherwise, will require industrial physicians to render reports to him. Under such circumstances the industrial physician should render such reports to the employer even though he is not required by law or by contract to do so.

For cogent reasons, all industrial injuries and occupational diseases should be required by law to be reported. Such reporting is necessary to prevent and control effectively such injuries and diseases as far as that is possible. Such reporting also furnishes valuable data for statistical and scientific purposes.

MEDICAL TESTIMONY IN COMPENSATION CASES

In any discussion of the legal and medicolegal aspects of compensation for industrial injuries and occupational diseases some mention should be made of the difficulty of obtaining reliable impartial medical testimony in compensation cases before workmen's compensation boards or before the courts. The medical profession, by medical opinions that are false or biased or founded on inadequate medical information and on possibilities rather than probabilities, has extended, more or less innocently, the scope of compensation. Uniform standards of evaluating disability due to injury or disease are urgently needed, as the American Medical Association has done with respect to appraisal of loss of visual efficiency. Better instruction in medical schools in industrial and legal medicine should do much to solve this problem.

Irrespective of the status or availability of accurate scientific information in the field of industrial medicine, medical testimony in compensation cases all too frequently is unreliable because of the medical witness himself. It is a most trying task for a medical witness to be absolutely unbiased and candid. To begin with, he is called to testify because his opinion is known to be favorable to the party calling him. If the medical witness was employed by the injured or diseased workman to treat him, he must be a man of great integrity to overcome the temptation to testify in such a manner as to help out the workman, especially since there may be financial gain to him if disability is prolonged. All too frequently, not only workmen and lawyers but also physicians attribute real or assumed pathologic conditions to trauma simply because such conditions appeared after an accident. This is not so strange when one recalls that in primitive times, long before the days of medicine, man because of his superstitious nature blamed external influences over which he had no control, such as gods, evil spirits and heavenly planets, for most of his bodily infirmities. Overreliance on medical and medicolegal textbooks is also responsible for some of the mistaken or unreliable medical testimony, because the authors too frequently round out their discussions of the etiology of pathologic conditions by adding, without scientific justification, the words "and injuries" or "also due to injuries," statements which had been copied and recopied from predecessors of even decades before. On the other hand, if the medical witness was or is employed by the employer of the injured or diseased workman, many factors, economic and otherwise, likewise come into play to tend to influence his testimony and make it favorable to the contentions of the employer. Indeed, it requires a physician of stern conscience and rigid integrity to resist all these various influences and testify to the truth and nothing but the truth.

Untrustworthy medical testimony in compensation cases, which is due to the incompetence or fault of the medical witness himself, may be of four types: (1) Where the physician, because of ignorance or lack of proper preparation, makes an honest error; (2) where the physician is so emotionally disturbed as to become confused and makes honest mistakes; (3) where the physician dishonestly makes a guess instead of frankly confessing his lack of medical knowledge, and (4) where the physician, perhaps one biased by his employment but more frequently a so-called professional expert medical witness who makes his living by deliberately giving false expert medical testimony, testifies falsely. Lawyers and judges use the professional expert witness only when they have to, but they do not respect him. His position, while perhaps lucrative, is certainly an unsavory one. His conduct has brought discredit to the medical profession and has done much to make honest physicians shun the courts.

In compensation disputes tried before courts of law the competence of medical witnesses is primarily the responsibility of the judge as he is the one who passes on their qualifications. High standards of qualifications for medical witnesses should be set and compliance with those standards should be required. Close cooperation in the matter of qualifications of medical witnesses between courts and the medical profession through local medical societies would seem to make for more reliable medical testimony. The feasibility and possible advantages of laws specifically authorizing courts to appoint nonbiased medical boards, composed of duly licensed and qualified doctors of medicine, to pass on questions requiring medical knowledge, would seem to be a fertile field for study. Likewise, the advantages in disputes before workmen's compensation boards of establishing medical boards or medical advisers, as some states have already done, to pass on medical questions, such as the relation of disability to trauma and the evaluation of disability, also merit earnest deliberation.

This discussion has touched only a few of the many legal and medicolegal phases of compensation laws of prime importance to physicians interested in the field of industrial medicine.

535 North Dearborn Street.

A Day's Sport.—A man's hobby must be something which his soul loves. Nor is its value measured only by the hours spent in its indulgence, since no small part of its benefit comes from pleasurable anticipation of joys to come or happy memories of past triumphs. Such relaxations afford relief to restless brains at unexpected times. How often have I gone to bed with a mind jaded and sleepless from medical worries, when pleasant thoughts of a day's sport have wiped the slate clean and sent me into sound sleep.—Smith, Lewis, in Doctors in Shirt Sleeves, edited by Sir Henry Bashford, London, Kegan Paul, Trench, Trubner & Co., Ltd., 1939.

Clinical Notes, Suggestions and New Instruments

ROENTGENOLOGIC DEMONSTRATION OF LOCALIZED GAS IN CAISSON DISEASE

J. O. GORDON, M.D., AND C. H. HEACOCK, M.D.
MEMPHIS, TENN.

The condition caisson disease, described as compressed air disease and divers' paralysis and commonly spoken of by the laborers as "bends," has been known for a long time. It is generally regarded as being due to a saturation of the tissues with nitrogen gas, followed by too rapid decompression, which allows the escape of bubbles of nitrogen into the tissues and into the blood stream, causing air embolism.

The disease was first studied by the French writers Bucquay, Foley and Bert during the latter part of the nineteenth century. Since that time important contributions to the subject have been made by Leyden, Haldane, Hill, Boycott, Smith and others.

The disease is encountered chiefly among workers in caissons and tunnels and in divers. It may also occur in very deep mines. The higher the pressure and the shorter the period of decompression, the greater the risk of precipitating an attack.

During compression, the air passing to the lungs is saturated with nitrogen under pressure. The nitrogen is carried to the tissues until the entire body is saturated. It has been shown by Haldane and Smith that the blood is 5 per cent of the body weight. Haldane has also shown that approximately one minute is required for the blood to return to the heart. During compression the capacity of the blood to take up nitrogen increases approximately 1 per cent for each additional atmosphere of pressure. If every part of the body was equally supplied with blood and the blood was one twentieth of the body weight, theoretically saturation would be complete in twenty circulations. Actually this is not true. The blood returns to the heart each time with a saturation equal to that of the tissues. Thus each time its power to receive additional nitrogen is lessened. In addition, 20 per cent of the body is composed of fat and Vernon has shown that fat takes up five times more nitrogen than ordinary body fluids. Haldane has estimated that half saturation takes place in fifteen minutes and that almost an hour

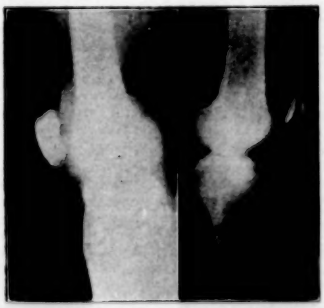

Fig. 1.—Gas in synovial sacs about three hours after injury.

is required for complete saturation. Saturation becomes more rapid during labor, because of the increased speed of the circulation.

During decompression the action is the reverse of the process just described. Supersaturated tissues give off nitrogen to the blood, which is desaturated by the lungs. This process keeps up until atmospheric equilibrium has been reached. Should the decompression take place too rapidly to allow this desaturation, gas bubbles of nitrogen will form in the body fluids and tissues. This formation of gas bubbles is the accepted theory, at present, of caisson disease. These bubbles form first in the venous blood, fatty tissues, synovial fluids of the joints, and the nervous system.

The symptoms may vary from headache, dizziness and feeling faint to nausea and vomiting or, in extreme cases, coma followed by death in a few hours. There is severe pain, usually in the legs and in the abdomen. Paralysis is rather common and usually transitory in the slight cases. Late changes are injury of the spinal cord, chronic arthritis and deafness.

Prophylaxis consists solely in gradual decompression and regulation of the shifts. It was early found that immediate recompression was the best remedy. Workers should live and

Fig. 2.—Resorption of gas six weeks later.

sleep near the works, where an air-lock is provided for immediate treatment. The inhalation of oxygen, under pressure, has been shown to reduce the partial increased pressure of nitrogen in the blood and thereby increase absorption of nitrogen by the blood. Morphine is frequently required for relief of pain, and in extreme cases circulatory stimulants are required along with the usual treatment for shock.

REPORT OF CASE

P. D., a white man, aged 30, employed as a tunnel worker, was admitted to St. Joseph Hospital, Memphis, Tenn., Nov. 19, 1938, complaining of severe pains in both lower extremities. Just prior to admission, while working in a tunnel, he was struck across both legs at about the level of the knee joints by a loaded "dinky tunnel car" as it overturned. He was working under 25 pounds of pressure at the time of the accident. Because of severe pain he was removed from the tunnel without spending the customary time in the decompression chamber. He gave a history of having been employed as a tunnel worker for six years and had on several previous occasions had "bends." There had been an injury to the right ankle in 1936.

On admission to the hospital at 2 a. m. he was seen by Dr. J. C. Ayres Jr., the associate of one of us (J. O. G.). He was complaining of severe pain in both knees and thighs. Because of the confusion and haste incident to removing him from the tunnel and bringing him to the hospital, he could not state definitely whether the pain immediately followed the accident or not. Later in the morning he stated that the severe lancinating pains were the same as he had experienced on previous occasions when he had had attacks of the "bends." More morphine was required to control his pain than is usual in fractures of the tibia. He did not complain of headache, dizziness or nausea.

Immediately after admission he was taken to the roentgenologic department for examination of both knees. This examination revealed irregular linear fractures of the upper ends of the tibias of both legs. On the right side the line of fracture involved the articular surface of the knee joint. There was no gross deformity or displacement of the fragments at either site. There was gas in the synovial sacs of both knees. This was believed to be due to the rapid expansion of the nitrogen molecules in the blood stream and the escape of this gas into the capsule (fig. 1).

At the physical examination the patient complained of severe pain in both legs at the level of the knee joints. This was aggravated by the slightest motion and by superficial palpation. There was swelling and ecchymosis about both knees and crepitus was easily elicited. Otherwise the examination was negative.

After the roentgenologic examination, Thomas splints were applied to both legs and morphine sulfate one-fourth grain (0.016 Gm.) was given for the pain. Urinalysis showed a trace of albumin and a few pus cells and bacteria. There were 14,250 white blood cells with 77 per cent polymorphonuclear leukocytes and 33 per cent lymphocytes.

The day following admission, plaster casts were applied from the midthigh down. Convalescence was uneventful from this time on, and a check-up x-ray examination on December 29 (fig. 2) showed the fragments of both tibias in good position. Bony union was fairly firm. All the gas in the synovial sacs had been absorbed and apparently there had been no permanent injury to the joints. The patient was discharged from the hospital Jan. 7, 1939, and he returned to work exactly twelve weeks after the injury.

We have been unable to find any mention of a case in the literature in which the diagnosis was supported by x-ray examination.

1418 Exchange Building.

LEATHER BUFFERS' NODES

LEON H. WARREN, M.D., WASHINGTON, D. C.

Bernardiino Ramazzini first called attention to the value of recognizing trade stigmas in the diagnosis of occupational dermatoses. Although many of the stigmas since recorded are merely fortuitous lesions which do not affect all or even a majority of workers in a trade, the stigma reported in this article affected each of the eleven workers employed at hand buffing of leather in a large tannery investigated. This stigma occurs at a constant site, is always bilateral and is characteristic.

The hand buffing of leather is a highly specialized but fast disappearing craft. Now that machines are replacing hand labor in this operation there are not more than fifty of these craftsmen remaining in the United States. These workers move from one tannery to another to supply temporary demands for their services in the buffing of certain types of leather. This operation is necessary for the removal of briar scratches, wire fence scratches, manure grain, tick bites and fly bites. The types of leather which require hand buffing are retan, harness, horse collar and horse butts, from which genuine cordovan leather is prepared. Hand buffers constitute a pseudoguild into which few apprentices are taken. Formerly the hand buffer came to work in frock coat and topper and was the aristocrat of the tannery workers. Even now, hand buffers work shorter hours than other tannery workers and limit their output to a certain number of sides (hides) daily.

Fig. 1.—Thumbs of three hand buffers.

Buffers' nodes, or calluses, as they are called by the workers, are a transient stigma as contrasted with permanent stigmas. When the worker goes on a month's vacation much of the node disappears. On his returning to work, until a new callus forms the site is again painful on rubbing, just as it was when the buffer was serving his apprenticeship. About three weeks is required for the development of a nonsensitive node.

Fig. 2.—Process of hand buffing leather.

The lesions are bilateral and occupy the major portion of the dorsal surface of the distal phalanx of the first digits of each hand. The individual node is round to oval, approximately from 1.5 to 2 cm. in diameter and 6 mm. in thickness. Figure 1 is the reproduction of a close-up photograph of the thumbs of three hand buffers.

In the operation of hand buffing the worker grasps a knife, known as a buffing slicker, having a cormate wooden handle and a thin rectangular steel blade approximately 4 inches by 6 inches by ⅛ inch (10 by 15 by 0.3 cm.). The edge of the slicker is hollow ground and must be sharpened by running a long thin round file along its edge. This knack is both difficult to acquire and difficult to retain. Some of the workers lose the knack either temporarily or permanently and must then have a fellow worker sharpen the blade.

The hand buffer grasps the slicker with the thumbs under and the other fingers of each hand over the steel blade. The palmar surfaces of the hands are pronated on the uppermost surface of the slicker. The nodes which constitute the hand buffers' stigma result from the necessity of having the thumbs slide firmly over the surface of the leather in order to gage the depth to which the buffing slicker shaves. Figure 2 illustrates the process of hand buffing leather and exhibits a thinly shaved ribbon which has been partially removed by a stroke of the slicker.

SUMMARY

During the buffing of hides, characteristic bilateral calluses invariably develop on the dorsum of the thumbs of leather buffers as a result of friction.

From the Office of Dermatoses Investigations, United States Public Health Service, Medical Director Louis Schwartz in charge.

Council on Physical Therapy

THE COUNCIL ON PHYSICAL THERAPY HAS AUTHORIZED PUBLICATION OF THE FOLLOWING REPORT. HOWARD A. CARTER, Secretary.

DRINKER-COLLINS ADULT RESPIRATOR ACCEPTABLE

Manufacturer: Warren E. Collins, Inc., 555 Huntington Avenue, Boston.

The Drinker-Collins Improved Adult Respirator is a device for producing artificial respiration simulating natural breathing for indefinite periods of time. A similar model has been accepted by the Council since 1931 (THE JOURNAL, May 9, 1931, p. 1580). Since that time certain improvements and changes have been made.

The unit functions by alternately producing a slightly subatmospheric and atmospheric (occasionally slightly positive) pressure in the chamber which encloses all the body except the head. The lungs are inflated during the negative pressure phase and passively deflated during the atmospheric pressure phase. The apparatus consists of a cylindric steel chamber mounted on a welded steel framework, which also supports the operating mechanism. The chamber contains a cot attached to the removable head-end closure. Casters on the legs of this closure and on the cot facilitate rolling the cot from the chamber for placing patients in the respirator. The respirator is mounted on casters so that it may be moved conveniently.

There are several models of this unit. In the Standard Model, the chamber is fixed in a horizontal position and is 28 inches in diameter throughout. In the Tilting-Rotating Model, means are provided for elevating the foot end of the chamber and tilting the cot toward either side to facilitate drainage of the respiratory tract. The Orthopedic Model embodies these features of the Tilting-Rotating Model and in addition is enlarged to a diameter of 42 inches at the head end, enabling use of "airplane splints" and other orthopedic appliances. In all models the interior length is 70 inches. Since the head is outside, persons up to about 6¼ feet in height may be accommodated.

Drinker-Collins Adult Respirator.

The net weight of the Standard Model is 470 pounds, of the Tilting-Rotating Model 540 pounds, and of the Orthopedic Model 760 pounds. Shipping weights (via Railway Express, wrapped but not crated) are 500, 570 and 800 pounds respectively, and by freight (boxed) 900, 970 and 1,300 pounds respectively.

The chamber of the unit is provided with five arm openings provided with sponge rubber diaphragms thus making possible various operations inside the chamber without interference with the respiration of the patient. Easily closed covers seal the arm openings when not in use. A larger opening is provided for the insertion of bed clothing and other articles. Four observation windows are equipped with nonbreakable panes. Other features include a rubber-covered mattress, a protected light bulb to illuminate the interior and an adjustable head rest and sponge rubber collar.

The pump consists of a corrugated rubber "accordion" style bellows, actuated by levers from a heavy-duty worm reduction unit connected by a variable speed drive to a one-fourth horse power electric motor. The bellows may also be operated by hand. The range of operating speeds when the motor is in use is about 14 to 28 respirations per minute. The motor is furnished for alternating or direct current as specified. A recessed control panel is mounted on the side of the respirator and bears the switches for the motor and light, the diaphragm type dial pressure gage, a positive pressure control and an overall pressure control to regulate both negative and positive pressures. The power consumption depends on the pressure used and on the rate of respiration. Under normal conditions it averages 200 watts.

Questionnaires were sent out by the Council to physicians and hospitals listed by the firm as having had experience with the unit. Eighteen replies were received, giving favorable data on the efficiency and durability of the apparatus. All the reports cited experience with the apparatus of at least several years' duration and included many cases.

The unit was submitted to a qualified physician for the purpose of clinical trial. A summary of the results of the Council investigation is as follows:

In comparison with the earlier model of the respirator, the new model is lighter and more attractive in appearance and it is quieter in operation on account of substitution of the bellows for the metal pump. A change from the sixteen small clamps on the old model to three large clamps used when sealing the head and cot in position for operation is a great improvement. The elevator screw for adjusting the level of the patient's head is also a good device which was not present originally. The instrument panel is an added convenience. A metal bar provided for hand operation of the bellows in case there is failure of electric current is another new factor which might be of vital importance. There is no question that this new model respirator is a much better machine than its predecessors from the standpoint of design, operation and convenience in adjustment.

The Council on Physical Therapy voted to accept the Drinker-Collins Improved Adult Respirator for inclusion on the Council's list of accepted devices.

Council on Pharmacy and Chemistry

NEW AND NONOFFICIAL REMEDIES

THE FOLLOWING ADDITIONAL ARTICLES HAVE BEEN ACCEPTED AS CONFORMING TO THE RULES OF THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION FOR ADMISSION TO NEW AND NONOFFICIAL REMEDIES. A COPY OF THE RULES ON WHICH THE COUNCIL BASES ITS ACTION WILL BE SENT ON APPLICATION.

PAUL NICHOLAS LEECH, Secretary.

LIQUID PETROLATUM (See New and Nonofficial Remedies, 1939, p. 300).

The following dosage forms have been accepted:

Emulsion Liquid Petrolatum, Chocolate Flavored: A palatable emulsion containing 60 per cent (by volume) of liquid petrolatum, 1 per cent agar agar per fluidounce and 0.1 per cent of benzoic acid added as preservative.

Prepared by the Smith-Dorsey Company, Lincoln, Neb. No U. S. patent or trademark.

Emulsion Liquid Petrolatum with 1½ grains Phenolphthalein per fluidounce, Chocolate Flavored: A palatable emulsion containing 60 per cent (by volume) of liquid petrolatum, 0.097 Gm. (1½ grains) of phenolphthalein-U. S. P., 1 per cent of agar agar per fluidounce and 0.1 per cent of benzoic acid added as preservative.

Prepared by the Smith-Dorsey Company, Lincoln, Neb. No U. S. patent or trademark.

Emulsion Liquid Petrolatum with 5 grains Phenolphthalein per fluidounce, Chocolate Flavored: A palatable emulsion containing 60 per cent (by volume) of liquid petrolatum, 0.32 Gm. (5 grains) of phenolphthalein-U. S. P., 1 per cent agar agar per fluidounce and 0.1 per cent of benzoic acid added as preservative.

Prepared by the Smith-Dorsey Company, Lincoln, Neb. No U. S. patent or trademark.

THIAMIN CHLORIDE (See New and Nonofficial Remedies, 1939, p. 498).

The following dosage form has been accepted:

Thiamin Chloride Tablets-Stearns, 1.0 mg.: Each tablet represents 333 U. S. P. units of thiamin chloride.

Prepared by Frederick Stearns & Co., Detroit, Mich.

CONCENTRATED POLLEN EXTRACT-ABBOTT (See New and Nonofficial Remedies, 1939, p. 37).

The following dosage form has been accepted:

Mixed Grass Concentrated Pollen Extract-Abbott (Blue Grass, Timothy, Orchard Grass, Red Top, and Sweet Vernal Grass in equal parts).

Prepared by Abbott Laboratories, North Chicago, Ill.

MANDELIC ACID (See New and Nonofficial Remedies, 1939, p. 313).

Mandelic Acid-Merck.—A brand of mandelic acid-N. N. R.

Manufactured by Merck & Co., Inc., New York. No U. S. patent or trademark.

INDUSTRIAL HEALTH

A GENERAL STATEMENT OF MEDICAL RELATIONSHIPS IN INDUSTRY PRESENTED BY THE COUNCIL ON INDUSTRIAL HEALTH

The Council on Industrial Health was created in 1937 as a standing committee of the Board of Trustees of the American Medical Association to assist the physician individually and through the agencies of medical organization to enlarge and improve his contribution to the health of the industrial worker. In recognition of the essentially educational nature of its functions the Council has accumulated information derived from a variety of sources which, together with investigations undertaken on its own account, are submitted in this special issue of THE JOURNAL. The complexity of relationships not only in industry itself but among the many organizations which are attempting to solve the health problems of the worker makes it impossible to include in this introductory discussion all the aspects of industrial health in which physicians, in one way or another, are interested. The Council acknowledges the assistance which it has received from physicians and other sources in the preparation of this subject matter.

It would be difficult to discover any field in the basic or clinical medical sciences which has not contributed to or been affected by health problems in industry. Nevertheless external influences, mostly socio-economic in nature, have played a considerable part in directing this interest into effective channels. These factors, mostly growing out of the increasing complexity of industrial and technologic development, have expressed themselves in a long train of social legislation. One phase of this legislation which has affected the medical profession particularly stems from the concept that injuries and diseases arising out of or occurring in the course of employment are chargeable to industry as part of the cost of production. This attitude has been implemented by the enactment of workmen's compensation statutes. Once adopted, compensation laws have forced on industry and the medical profession the realization that the majority of industrial accidents and unhealthful exposures are in the main preventable. Likewise it has become apparent that improved health of the worker through medical supervision and engineering control of industrial environment, as a rule, favorably affects rates of industrial production.

The period over which workmen's compensation laws have exerted an influence on medical practice in the United States covers about thirty years. The entire development of purposeful health control over workers, therefore, falls well within the professional experience of many physicians in practice today. The early reliance on curative and reconstructive measures lumped under the general heading of compensation practice is no longer sufficient. Only through the principles of preventive medicine can the physical and environmental status of working people be successfully improved. The range of interest, therefore, has grown immeasurably under the double impulsion of humanitarian and economic influences not alone in clinical fields but in improved organization, administration and investigation. The principal manifestations of this expanding program currently are the incorporation of occupational diseases into workmen's compensation coverage and the growing conviction that many of the problems of adult hygiene have occupational implications that can be most successfully combated by using the industrial approach.

THE SCOPE OF INDUSTRIAL HEALTH

Industrial health is an inclusive term, incorporating three major types of activity.

1. Medical and surgical care to accomplish prompt restoration to health and earning capacity following industrial accident or disease.

2. Prevention of disease or injury in industry by the establishment of proper control over industrial environment.

3. Education of employees about healthful living, both in and out of the industrial environment.

Industrial health, then, in the broad use of the term, is a composite of current knowledge drawn from medicine, surgery, nursing, sanitation and health education.

TABLE 1.—*Gainful Workers 10 Years Old and Over, by General Divisions of Occupations and Sex, for the United States, 1930*

	Total	Male	Female
All occupations	48,829,930	38,077,804	10,752,116
Agriculture	10,471,998	9,562,059	909,939
Forestry and fishing	250,469	250,140	329
Extraction of minerals	984,325	983,564	759
Manufacturing and mechanical industries	14,110,652	12,224,345	1,886,307
Transportation and communication	3,843,147	3,561,942	281,204
Trade	6,081,467	5,118,787	962,680
Public service (not elsewhere classified)	856,205	838,622	17,583
Professional service	3,256,884	1,727,650	1,529,234
Domestic and personal service	4,952,451	1,772,200	3,180,251
Clerical occupations	4,025,324	2,038,494	1,986,830

Fifteenth Census of the United States: 1930, Occupation Statistics.

A real understanding of industrial health must be based on a recognition of the part which each of these components plays and the relationships which practicing physicians have established or should establish with them.

POPULATION GROUPS INVOLVED

Another expression of the scope and importance which industrial health has come to occupy rests principally on the great numbers of the population involved. The first table illustrates the divisions and subdivisions of the gainfully employed by sex and by major occupational classification. These figures, while they are inapplicable today because of considerable shifts in employment, still provide some insight into the relative distribution of wage earners according to occupation. Fifty million people represent 39.8 per cent of the total population and nearly 50 per cent of the population 10 years old and over. Any program which has as its principal objectives the improvement of the health of such a large segment of the population must necessarily be of paramount importance to the medical profession.

THE UNEVEN DISTRIBUTION OF INDUSTRIAL HEALTH SERVICES

The dangerous trades are largely concentrated in the manufacturing, mechanical and mining industries, which provide employment to about fifteen million wage earners. These groups, as a result, have received the greatest amount of attention from industrial physicians and hygienists. Of the hundreds of listed occupations which are considered potentially hazardous to health, a major portion will be found in these occupational classifications. Attention needs to be directed to other classes of wage earners in order to identify and control such unhealthful exposures as may exist. Of equal importance is the uneven application of industrial hygiene as between large and small manufacturing plants. Plants employing 1,000 or more workers have, on the whole, found themselves in the most advantageous position to organize and maintain reasonably complete medical services. Table 2 demonstrates the overwhelming number of manufacturing establishments which fall below this rank. Roughly, one half of the workers in manufacturing plants are employed in establishments having fewer than 250 persons. Of all manufacturing concerns, 97 per cent are found in this category.

Extending industrial medical service to small plants is a difficult problem. When means are found to provide qualified medical assistance in the control of industrial hazards universally, approximating the character of service now supplied in many large industrial units and satisfactory both to those who supply the service and to those who receive it, a substantial level of medical achievement will have been reached.

TABLE 2.—*Industrial Establishments Classified According to Number of Wage Earners in the United States*

Establishments Employing	Number of Establishments	Number of Wage Earners
No wage earners	6,885	
1 to 5 wage earners	62,164	170,174
6 to 20 wage earners	46,402	514,487
21 to 50 wage earners	23,138	750,922
51 to 100 wage earners	11,911	852,373
101 to 250 wage earners	9,745	1,522,670
251 to 500 wage earners	3,911	1,365,600
501 to 1,000 wage earners	1,660	1,235,323
1,001 to 2,500 wage earners	737	1,080,534
2,501 or more wage earners	241	1,181,748
Totals	166,794	8,569,231

U. S. Census of Manufactures, 1937.

EFFECTS OF OCCUPATION ON HEALTH

The clearest evidence of direct relationship between occupation and life expectancy lies in the excessive accident and disease rates which attach to certain employments. For example, loggers, structural iron workers, riggers and explosive makers are subjected to such unusual risks as to make them either ineligible for life insurance protection or acceptable only at much higher premium rates. Workers in dusty trades find themselves in a similar position, as do those exposed to industrial poisoning or to the hazardous effects of other industrial environments either by direct effect or through increased incidence of tuberculosis, pneumonia, cancer and possibly other degenerative diseases. Many statistical approaches have been undertaken to appraise the general effects of occupation on mortality, including the study of labor union records, reports of workmen's compensation agencies and insurance companies, and death certificates. None have proved entirely satisfactory. The absence of uniform and usable statistics is a serious obstacle to a rational attack on those occupational factors which most closely affect the public welfare. Statisticians have attempted to throw some light on the subject by grouping data referring to specific occupations into broader socio-economic classifications. The most recent study in this country along these lines has been prepared by Whitney, drawn from mortality data in the 1930 United States Census and published by the National Tuberculosis Association (table 3).

TABLE 3.—*Standardized Death Rates from Specified Causes per 100,000 Gainfully Occupied Males 15 to 64 Years of Age According to Occupational Classes, 1930*

	Death Rates per 100,000 Occupied Males											
Occupational Classes	All Causes	Diseases of the Heart	Tuberculosis of the Respiratory System	Cancer and Other Malignant Tumors	Pneumonia	Nephritis	Cerebral Hemorrhage and Softening of the Brain	Diabetes Mellitus	Cirrhosis of the Liver	Suicide	Accidents
All gainfully occupied males in selected occupations	969.8	175.3	87.5	81.7	69.3	57.9	42.0	12.1	10.7	33.4	29.5
Professional men	670.5	177.0	36.2	70.3	38.8	31.4	48.3	10.9	10.8	28.8	14.5
Proprietors, managers and officials	792.5	184.2	43.2	81.0	53.0	56.2	58.0	16.2	14.4	39.5	22.3
Clerks and kindred workers	775.2	185.5	65.8	77.7	50.5	54.1	50.8	13.5	10.2	34.6	18.7
Agricultural workers	625.2	95.9	46.5	56.2	43.4	41.3	36.3	9.4	4.3	29.0	15.1
Skilled workers and foremen	858.9	166.0	72.1	85.4	59.7	54.1	58.8	10.9	10.0	38.7	31.2
Semiskilled workers	1069.3	199.5	102.1	90.8	71.6	59.6	41.4	13.2	10.5	41.9	34.1
Unskilled workers	1447.7	243.0	184.9	106.6	133.9	83.4	58.3	12.5	17.0	44.1	51.7

Source: National Tuberculosis Association, 1934.

Standardized according to age distribution of all gainfully occupied males in ten selected states: Alabama, Connecticut, Illinois, Kansas, Massachusetts, Minnesota, New Jersey, New York, Ohio and Wisconsin.

Most difficulty is experienced in dissociating the direct effects of daily work on life expectancy from the coincident effects of domestic environment, hereditary influences, general intelligence and other social and economic factors, of which income, housing and nutrition are conspicuous examples. Very likely, many occupations carry no particular health risk at all or the occupational factor in mortality is so small as scarcely to be measurable. Certain employments appear to have positive health advantages, as, for example, agriculture and the professions (table 3). In any event, considerable improvement has occurred in the life expectancy of wage earners during recent years. At least in some disease classifications improvement has proceeded with

greater momentum than in the general population. Contributors to these results have been the safety movement, the improved application of industrial hygiene, the establishment of industrial medical services and the interest which workmen themselves are assuming in health matters.

Mortality statistics do not represent the actual health status of any group, and wage earners are no exception. Yet morbidity data referring to occupations are, on the whole, even more unsatisfactory than death records. Excellent analyses are available with respect to the effect on health of certain specific occupational exposures and the incidence of permanent and temporary disability resulting from industrial accidents. Various studies also have been made on the general incidence of sickness of all types causing absenteeism. The ability to evaluate properly the etiologic relationships of occupation to unhealthy states and to record them promptly and in sufficient detail will constitute one of the major contributions of the medical profession to the industrial health movement.

INDUSTRIAL ACCIDENTS

Injury or death caused by industrial accidents constitutes, for a good share of the medical profession, the only appreciable contact they have had with industrial problems. Accidents rank second among males and fourth in the total population as a cause of death (table 4). Occupational fatalities among white male policyholders of the Metropolitan Life Insurance Company accounted for 20.4 deaths per hundred thousand in 1938. In 1913 the rate reached as high as 45.7. Industrial injury rates follow more or less closely the curves of employment and business activity, but the 50 per cent decline in deaths from industrial injury is, at least in part, the result of concentrated efforts by industry to control the causes and consequences of accidents. Table 5, derived from the Bureau of Labor Statistics, U. S. Department of Labor, is a compilation of the estimated number of disabling injuries occurring in 1938 by industry groups. Certain of these figures are stated to be derived from incomplete and fragmentary sources.

Industrial accidents, as usually defined, are injuries arising out of and in the course of employment. Accident statistics are compiled in terms of frequency and

TABLE 4.—*Rank of Accidents as the Cause of Death*
Death rates per 100,000 population.

Total Population		Males		Females	
Heart disease	268.0	Heart disease	304.3	Heart disease	230.8
Cancer	112.0	**Accidents**	114.4	Cancer	121.3
Pneumonia	85.1	Cancer	103.0	Cerebral hemorrhage	78.4
Accidents	81.4	Pneumonia	97.2	Chronic nephritis	74.7
Chronic nephritis	79.6	Chronic nephritis	84.4	Pneumonia	72.7
Cerebral hemorrhage	77.0	Cerebral hemorrhage	73.7	**Accidents**	47.6
Tuberculosis	53.6	Tuberculosis	60.8	Tuberculosis	46.3

Accident facts, 1939. National Safety Council, 1939. U. S. Census Bureau data, 1937.

severity. Frequency rates are an expression of the number of accidents per million man hours of work exposure. Much effort has been expended in developing uniform methods of reporting, but data from various sources must be examined critically because of variations in scope, definition of accident, and the method of accident exposure calculation. Severity rates are compiled on the basis of the extent of the resulting incapacity expressed in days of lost time per thousand man hours of work. From the point of view of severity, further classifications are possible—into fatal and nonfatal cases, the latter susceptible of reclassification according to whether the effects of injury are permanent or temporary.

The industrial accident problem has been regarded so long as an economic, industrial and engineering problem

TABLE 5.—*Estimated Number of Disabling Injuries During 1938, by Industry Groups*

	Number of Injuries					
	All Disabilities			Death		
Industry Group	Total	To employees	To self-employed	Total	To employees	To self-employed
All industries	1,375,000	1,237,000	138,000	16,400	15,600	1,400
Agriculture	267,400	267,400	.....	4,400	4,400	.....
Mining and quarrying	82,000	82,000	.....	1,700	1,700	.....
Construction	292,300	270,900	21,300	2,600	2,400	200
Manufacturing	220,800	214,200	6,600	1,900	1,700	200
Public utilities	16,300	16,300	.....	500	500	.....
Trade: wholesale and retail	201,500	157,600	43,900	1,800	1,400	400
Railroads	30,300	30,300	.....	600	600	.....
Misc. transportation	52,600	33,100	19,500	700	500	200
Services and misc. industries	212,300	165,300	47,000	2,200	1,800	400

	Permanent Disabilities			Temporary Disabilities		
Industry Group	Total	To employees	To self-employed	Total	To employees	To self-employed
All industries	98,000	85,300	12,700	1,260,300	1,136,600	123,300
Agriculture	13,000	13,000	.....	250,000	250,000	.....
Mining and quarrying	2,300	2,300	.....	77,800	77,800	.....
Construction	14,000	13,500	1,100	275,000	255,000	20,000
Manufacturing	14,000	13,000	1,000	204,900	199,700	5,400
Public utilities	700	700	.....	15,100	15,100	.....
Trade: wholesale and retail	39,700	31,200	8,500	160,000	125,000	35,000
Railroads	1,500	1,500	.....	28,200	28,200	.....
Misc. transportation	1,000	600	400	51,200	32,000	19,200
Services and misc. industries	11,900	9,200	2,700	198,100	154,200	43,900

Source: Bureau of Labor Statistics, United States Department of Labor.

that its medical aspects have been to a considerable degree overlooked. The associated factors can be understood best through examining two major aspects —prevention and individual medical management. Prevention deserves first consideration and, in most instances, has received it. Such tactics appeal to industrialists as businesslike, since reduced accidents result in reduced compensation insurance premiums. Out of this interest have grown the safety movement and the professional approaches represented by safety and industrial hygiene engineers. As developed in this country, the major functions of prevention of industrial accidents have grouped themselves into subdivisions representing research, engineering, safety education and medical control.

Research includes the study of reports and the analysis of all available statistics regarding the causes and consequences of accidents. Sources of information are industrial commissions, state departments of labor and insurance companies, all of which compile valuable analyses of accident experience and causation. The Bureau of Labor Statistics of the U. S. Department of Labor and the National Safety Council are the most important agencies gathering and correlating raw industrial accident data.

The engineering aspect of accident prevention refers to the control of mechanical factors, either those which cause accidents or those introduced to reduce hazards. Through such methods sound safety practices are established and safety codes formulated which ultimately constitute a basis for safety legislation.

Education relates to general propaganda as well as individual and group instruction in the avoidance of accidents. Safety contests, meetings, posters and similar functions are important parts of such programs.

Medical industrial accident control consists of physical examination of workers, both prior to employment and periodically during the course of employment. When properly conducted, such examinations promote safe placement of applicants for work and maintain regular employees in positions geared to mental and physical capacity. Minor physical defects are not necessarily significant in industrial physical supervision and should not carry too much weight in the total evaluation of the individual. Gross physical defects should be given the importance they deserve. Much emphasis is currently attached to the study of the worker from the point of view of accident proneness. These investigations involve appraisal of the psychomotor apparatus and personality types in order that placement may occur in work consistent with least risk and greatest aptitude. The rapid growth in the use of automatic machinery is a case in point, altering the role of the worker from that of a machine operator to that of a machine tender. Changes of this character may bring about severe alterations in the attitude of the worker to his job. A much higher degree of selection among personality types is therefore involved in order to prevent monotony, fatigue and dissatisfaction. Furthermore, laxness in concentration on the industrial operation is a prolific cause of accidents and is directly related to such social and economic conditions as income, housing and nutrition. All together, there are a wide variety of factors which are considered to have greater or lesser effect on accident occurrence which need to be understood by physicians, such as age, length of time on the job, time of day, character of ventilation, illumination, and other considerations which may be personal to the worker or affecting groups of workers.

The second important aspect of the industrial accident problem refers to competent medical care of the injured worker. This implies suitable medical organization for control of accidents and immediate treatment. Control and treatment are accomplished through first aid, nursing, part or full time physicians and arrangements for hospitalization. The value of treatment will be determined by the qualifications of the physician not solely from a surgical point of view but according to his intimate knowledge of the total industrial problem. An ideal result for all concerned would be full restoration of the injured workman to his former earning capacity in the same line of work and with minimum loss of time. Approximations to this standard will constitute the measure of successful medical management, which must be sympathetic and tactful enough to instill a desire to get well and return to work. The medical and legal responsibilities relating to the determination of temporary and permanent disability and the completion and prompt filing of forms and blanks for industrial commissions and insurance companies must be accepted as an obligation as well as a field for some necessary reform.

OCCUPATIONAL DISEASES

Occupational diseases, troublesome as they are to certain industries, are for industry as a whole the least important cause of lost time disability (table 6). Reliable statistics about the incidence of occupational diseases are scarce and, to complicate the picture still more, not much is known about the chronic or subacute effects of long continued exposure to low concentrations of toxic industrial materials. Even to define occupational diseases has proved difficult, as the language used in the

TABLE 6.—*Absenteeism from Illness and Injury in Industry*
Days lost per employee per year among 352,791 workers.

Cause of Lost Time	Days Lost
Occupational disease	0.01
Industrial injury	0.59
Noninduatrial injury and illness	8.85

Source: American College of Surgeons.

statute relating to occupational disease in Illinois described elsewhere in this issue amply illustrates.

To facilitate understanding, attempts have been made to classify occupational diseases. Bulletin 582 of the Bureau of Labor Statistics, U. S. Department of Labor, contains such a classification prepared by Dublin and Vane under the following headings:

A. Abnormalities of temperature and humidity.
   1. Extreme dry heat.
   2. Heat and humidity.
   3. Sudden variations of temperature.
B. Compressed air.
C. Dampness.
D. Defective illumination.
E. Dust.
   1. Inorganic dust.
   2. Organic dust.
F. Infections.
   1. Anthrax.
   2. Hookworm.
   3. Septic infections.
G. Radiant energy.
   1. X-rays, radium and other radioactive substances.
   2. Ultraviolet and infra-red rays.
H. Repeated motion, pressure, shock.
J. Poisons.

These headings provide some insight into the general nature and causes of occupational diseases, all of which will be subjects for more extensive treatment in subsequent publications by the Council.

Occupational disease reporting needs particular emphasis. No disease can be controlled unless its nature and extent can be ascertained with reasonable accuracy. Some states, therefore, have attempted to secure such information by making occupational diseases reportable by physicians. The value of such reports is obvious, but results have been negligible because physicians frequently fail to recognize occupation as an etiologic factor in disease. The limited notations about occupation on death certificates constitute the only evidence possessed by many state health departments regarding the occurrence and effects on health of industrial exposures.

A number of states have enacted workmen's compensation laws covering occupational diseases. Some have schedules specifying the occupational diseases which come within the scope of the statutes. Certain

jurisdictions compensate for occupational diseases under all inclusive acts often referred to as blanket coverage. Included in these classifications are the principal industrial states in this country. Since adequate information based on the reporting of occupational diseases by physicians is largely nonexistent, an index to their prevalence has been sought in the number of these diseases which have been compensated, especially in the predominantly industrial states. Accurate as the reports of compensation boards are in other respects, data on occupational disease are fragmentary and difficult to assess. Diseases listed in a schedule adopted by a state and actual diseases reported by the industrial commission as compensated may bear no close relationship. Even when statistics are carefully kept, the use of inclusive terms makes detailed information difficult to secure. Silicosis and asbestosis may be included under the term "tuberculosis—all forms" and acute industrial poisoning may be lumped under the heading "poisonous and corrosive substances." Present evidence, however, indicates that occupational disease claims of all types are increasing in number and in cost. Industrial dermatitis is far and away the most prevalent cause, approaching 70 per cent of closed claims in some areas. Good conclusions about other aspects of occupational disease must await the adoption of standardized reporting according to terminology which renders them identifiable in all states, no matter what methods are employed for extending compensation coverage.

ORDINARY ILLNESS IN INDUSTRY

Industrial accidents and occupational diseases have received most attention from industrial physicians and hygienists. They are associated with work as proximate cause, a relationship which has been recognized in workmen's compensation practice. It has been, therefore, to the advantage of industrialists first to seek out means for reducing the frequency and severity of work related disability. Yet in industry accidents and occupational diseases account for a very small proportion of all time lost by workers to disabling injury or sickness. Data shown in table 6, derived from studies conducted by the American College of Surgeons, illustrate the much greater probability of lost time from ordinary illness than from accident or disease arising out of work. These and other data indicate that male workers lose nearly nine days annually to disabling sickness or injury, and in every thousand male workers every year nearly one hundred absences of seven days or longer will occur. As a rule there will be more sickness among women employees, both as to frequency and extent, and more among married than single women. The principal causes of lost time in industry for men and women both are the diseases and complaints which make up the bulk of general practice everywhere. This is, in the main, true regarding absences of longer or shorter duration. Economically, losses in wages and through disruptions in production schedules must be estimated in billions of dollars each year.

Although not responsible for ordinary sickness and injury, there are excellent incentives for industry to analyze uniformly and regularly all lost time by employees, no matter what the cause, duration or end result. Such information is the best available guide to the need for specific health activity in industry and the directions it should take. The merits of this type of approach have been amply demonstrated to industry by the published analyses of morbidity and mortality data by public health and other agencies. Uniform methods of recording work absence will assist greatly toward clarifying relationships between physical and mental capacity or defect as revealed by physical supervision and lost time. Only fragmentary data are available which correlate these factors with occupation, skill and experience as well as age, sex, color, marital status, duration of illness and other factors needed for straight or comparative statistical purposes. Likewise, the beneficial aspects of controlled and accurately recorded observations about the health of employed groups obviously cannot be restricted to industry or the industrial employee alone. They can hardly fail of providing much better understanding of community health problems as a whole.

When causes of lost time are considered, a good share of the medical problems of industrial health fall clearly in the province of private medical practice. The extension of preventive medical methods in order to reduce all loss of time, absenteeism and short work spans is one of the objectives of industrial health. Results will be accomplished best if public health workers in industry and in the government recognize the contributions which private physicians in general and special practice can and ought to make towards more adequate health control over workers in both large and small industry. The interests of the worker are best served if the interdependence of all elements in the profession is accepted as a proper foundation for the development of a well balanced industrial health program.

THE PHYSICIAN IN INDUSTRY

The simplest way to classify physicians practicing in industry is in relation to the time they devote to it—full time, part time or on call. Much confusion has occurred in professional minds from a failure clearly to distinguish the objectives of these groups. In a strict sense the full time industrial physician represents in the whole field of medicine that segment of special interest which applies the theory and practice of medicine to the health of employed groups. As such the work they do is set apart from the individual case work of the private practitioner whose contribution to industrial health mainly restricts itself to curative and reconstructive phases of occupational injuries and diseases. Even under this limited type of service it is estimated that private physicians engaged in general or specialty practice supply more than four fifths of the medical service which industry is obliged to give or which it provides in an enlightened view of the effects of unhealthful exposure on employees and hence on production.

TABLE 7.—*Increase in Industrial Practitioners*

	1934	1936	1938
Limiting practice	252	289	345
Giving special attention	870	990	1,054

American Medical Directory.

The record of growing interest in industrial medical services and the increasing recognition of the usefulness of such a career are shown in the accompanying table drawn from the American Medical Directory. These tabulations demonstrate substantial increases during the last few years in the number of physicians limiting or giving special attention to industrial practice.

According to Selby, industrial medicine as practiced by competent and ethical physicians who devote all or

a major share of their activities to it attempts to furnish employees with the best possible health protection consistent with:

1. The purpose of industry.
2. The employer's responsibility as fixed by law for competent care and prevention of occupational injury and disease.
3. The employee's right to free choice of medical counsel in all health matters not occupational in origin.

The relationships which ordinarily need most clarification as between physicians in industry and private practitioners refer to three principal lines of activity—industrial hygiene, physical supervision and therapy.

INDUSTRIAL HYGIENE

It has been quite generally felt that the physician in industry fulfils his function best if he regards himself, over and above statutory requirements, as health officer of the plant responsible for plant hygiene. His special understanding of the control of industrial exposures constitutes the professional equipment which distinguishes his activity from ordinary private practice and from conventional preventive medicine as well. He advises and assists employers to protect workmen against physical impairment arising out of occupational environment. His success is measured according to his familiarity with toxic agents and harmful processes, the adequacy of protective devices and their suitable maintenance, and particularly the persistence with which he pursues practical solutions of these problems. Activities such as these are in the best tradition of preventive medicine and do not involve competitive relationships with private practice. Nevertheless, the medical profession has certain very definite opportunities and responsibilities toward furthering and upholding standards of industrial hygiene.

Employers of all grades will become more generally aware of the importance of industrial hygiene as values are demonstrated through practical application by fellow employers, through the impetus provided by the workmen's compensation statutes and through the urgings of the industrial organizations and trade associations themselves. Once an employer develops an interest in controlling plant hygiene problems, he is likely to turn first to the physician who takes care of his industrial injuries. If this source fails him, as it frequently does, helpful assistance may be obtained only with great difficulty. Every physician has on this basis then an opportunity for constructive preventive medical achievement which no amount of personal distaste ought to impel him to ignore. It is the function of medical organization and education to prepare private physicians either to give reliable advice directly about industrial health service or to acquaint him with sources of authoritative information.

TABLE 8.—*Medical Services Supplied in Industrial Establishments Classified According to Size of Plant*

Total plants reporting, 611 Total employees covered, 1,120,602

	1,000 and Over		500 to 1,000		100 to 500		Under 100	
	Number	%	Number	%	Number	%	Number	%
Establishments	196	32.0	98	16.0	200	32.7	117	19.1
Employees covered	1,001,763	89.3	63,982	5.8	48,857	4.4	5,460	0.5
Full-time physicians	93	47.4	21	21.4	37	18.5	0	0
Full-time nurses	166	84.7	51	52.0	39	19.5	3	2.6
Part-time nurses	7	3.6	15	15.3	15	7.5	6	5.1
No nurses	23	11.7	32	32.7	146	73.0	108	92.3
First aid	190	96.9	93	94.9	186	93.0	94	80.3
Workmen's compensation	186	94.9	91	92.9	180	90.0	99	84.6
Pre-employment examinations	186	94.9	84	85.7	137	68.5	54	46.2
Periodic examinations	140	71.4	51	52.0	85	42.5	27	23.1
Accident and disease prevention	167	85.2	76	77.6	124	62.0	49	41.9
Plant sanitation	153	78.1	56	57.1	88	44.0	27	23.1
Health education	129	65.8	42	42.9	59	29.5	11	9.4
Medical advisory service	150	76.5	56	57.1	109	54.5	33	28.2
Clinical laboratory *	107	54.6	36	36.7	70	35.5	25	19.9
X-ray *	107	54.6	38	38.8	83	41.5	50	42.7
Physiotherapy *	108	55.1	43	43.9	61	30.5	27	23.1
Dental service	35	17.9	4	4.1	8	4.0	1	0.9

* In the plant or readily available.

PHYSICAL SUPERVISION

Effective as industrial hygiene has proved to be, other useful practices have come to be included as functions of industrial medical service. Alleged aggravation, by the nature of the work, of preexisting and coexisting diseases not in themselves occupational in origin has necessitated physical examination of applicants for work. Properly, these are conducted at the time of employment to assure safe placement and often enough thereafter to assure protection against diseases originating in or unfavorably influenced by occupation, and for diagnosis to establish the occupational or nonoccupational origin of disability.

In respect to physical supervision, two major considerations present themselves as factors affecting relationships of private physicians to industry. In increasing numbers of plants they are likely to be called on to undertake physical examinations of workers which, aside from certain medicolegal considerations, they ought to be competent to perform provided they supply the service with as much impartiality as it is possible to assume. The usefulness of this service will be greatly increased if physicians have good knowledge of the working conditions, materials and processes to which examinees are exposed.

Of far greater importance to private physicians are the enormous number of physical defects which are uncovered by industrial physical examinations. Correction of these defects is a function not of industry but of private practice. Efforts which the physician in industry, full or part time, can undertake in bringing together family physicians and the workers needing medical care have such beneficial aspects to all concerned as hardly to warrant argument. Deviations from this principle on the part of physicians in industry who have used industrial connections as an unfair competitive device in the development of private practice constitute the major reasons why industrial medicine has suffered severely in the eyes of the general medical profession.

THERAPY

Workmen's compensation acts have obliged employers to furnish treatment. In a great many instances medical services in industry grew out of this obligation. As a rule there is little disposition by employers to assume any responsibility for treatment beyond this point. The variable elements of friction which have existed between the industrial physician and the private practitioner in respect to freedom of choice of medical counsel for the care of not only ordinary sickness but industrial disability are much more likely to diminish than otherwise. The full time industrial physician, if present trends prevail, will be less and less a therapist and more and more an administrator of public health

through the application of industrial hygiene. In that capacity he should assume a public health function and act as a case finder for the private physician and specialist, through whom the direct remedial service should be applied. He should act as an active participant in the rehabilitation of injured workers through selection of suitable occupational therapy in the sense of restoration to earning capacity under conditions of controlled work. With these exceptions and the attention to minor injuries or ailments for which the worker consults the plant physician largely because he is accessible and no lost time is involved, therapy is likely to be a diminishing segment of the industrial medical officer's activity. This trend of industrial medicine to ally itself with private practice in the care of industrial patients needs to be widely extended. Much will depend on the private physician's capacity to care for compensable disability competently and with the least possible loss of working time. Incompetent, dilatory or dishonest practices in this field are not only thoroughly unprofessional but are, in the industrial field, private practice's most active competitor.

FUNCTIONS OF MEDICAL SERVICE IN INDUSTRY

The functions of medical service in industry, then, can be listed as:

1. Regular appraisal of plant sanitation.
2. Periodic inspection for occupational disease hazards.
3. Adoption and maintenance of adequate control measures.
4. Provision of first aid and emergency services.
5. Prompt and early treatment for all illnesses resulting from occupational exposure.
6. Reference to the family physician of individuals with conditions needing attention, cooperating with the patient and his physician in every practical way to remedy the condition.
7. Uniform recording of absenteeism due to all types of disability.
8. Impartial health appraisals of all workers.
9. Provision of rehabilitation services within industry.
10. The conduct of a beneficial health education program.

An attempt has been made by the Council on Industrial Health to determine the frequency with which these services are provided by industrial physicians in plants of varying sizes and types. Requests were first addressed to secretaries of state and county medical societies for as complete lists as possible of all physicians engaged full or part time in industrial practice. By this means a total of 2,544 names was secured. To every other one of these names, arranged alphabetically according to states, a questionnaire was directed. No two physicians were employed in the same plant. Four hundred and twenty-five tabulatable replies were received containing data supplied by the physicians responsible for health control in 611 individual establishments and for 1,120,062 employees.

COMPARISON OF MEDICAL SERVICES SUPPLIED BY PLANTS OF VARYING SIZES.

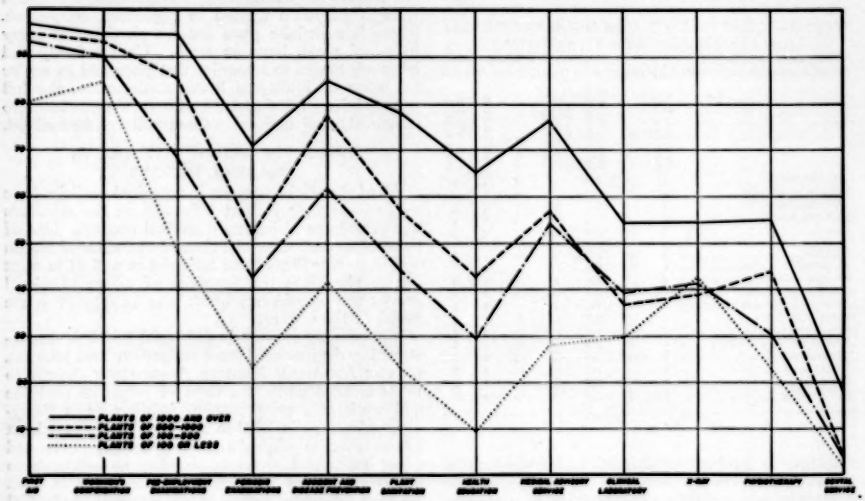

Table 8 classifies services supplied by industrial physicians according to size of plant and demonstrates in adjoining columns the ability of plants of varying capacity to support the principal components of industrial medical services. The distribution of industrial plants according to size in the sample is shown in the table. Of the 1,120,062 employees covered, nearly 90 per cent were found to be in the largest units. All plants had at least part time medical service. Full time physicians were reported in 47 per cent of the plants employing more than 1,000 workers and in none of those employing fewer than 100. The data regarding full time nursing service show a similar diminution from the large to the small plants, almost fading out entirely in the establishments employing under 100 men. In this group 92 per cent of the plants had no nursing services at all.

First aid services and the care of compensation cases are quite uniformly supplied in plants of all sizes because of legal requirements existing in most of the states. In all other respects the smaller the plant the greater does it appear at a disadvantage in the supplying of industrial medical service. The more complete provision of preventive medical service in large plants is reflected in such activities as preemployment and periodic examinations, accident and disease prevention, plant sanitation, health education and medical advisory services. The latter refers particularly to advice supplied about physical defects not occupational in origin and testifies in a great many cases to cooperative relationships which are developing between industrial medical services and the workers' family physicians. In plants of all sizes physical examination of applicants for work is observed to a much higher degree than subsequent periodic surveys. X-ray and clinical laboratories are said to be located in the plants or "readily available," in a substantial proportion of establishments in all classifications, a reflection of the need for precise information about the physical condition of applicants and, less regularly, for other employees, unless they are exposed to harmful materials and processes. The extent to which consulting radiologists and clinical pathologists are used is not known, but presumably in ordinary cases their services will not be called for. The question of standardized technic and the competence of interpretation of radiologic and pathologic examinations in industry needs additional investigation. The provision of physical therapy equipment in these plants is appreciable in all categories, presumably to facilitate follow-up care of industrial injuries where this type of restorative treatment can be applied with the smallest amount of lost time. Diagnostic dental service, on the other hand, is largely underdeveloped in industry, although correctable dental defects are the most frequent conditions found in industrial physical examinations. Other consulting services most frequently mentioned are those supplied by ophthalmologists and dermatologists.

The nature of the industry in which these medical services are organized is shown in table 9. The predominance of manufacturing and mechanical industries in the tabulation is a natural one indicative of the predominance of harmful industrial exposures in occupations falling in this group. Mines are well represented in all the medical service brackets and, to a somewhat less extent, transportation and communication. Most of the examples of extended medical service mentioned in the replies to the questionnaire were reported from these groups. In most of the other categories, figures are too small to have much significance.

TABLE 9.—*Medical Services Supplied in Industrial Establishments Classified According to Type of Industry*

Total plants reporting, 611 Total employees covered, 1,120,082

	Farming, Forestry, Fishing	Mining	Manufacturing and Mechanical	Transportation and Communication	Trade	Public Service	Domestic, Personal Service
Establishments	7	99	404	56	47	7	6
Full-time physicians	1	32	86	9	9	2	1
Full-time nurses	1	30	182	16	17	3	2
Part-time nurses	0	7	23	4	3	0	1
No nurses	6	59	199	36	27	4	3
First aid	6	90	372	51	43	7	5
Workmen's compensation	7	90	371	50	40	6	4
Pre-employment examinations	3	72	305	46	31	3	3
Periodic examinations	1	40	209	36	20	3	2
Accident and disease prevention	2	64	275	36	29	4	2
Plant sanitation	1	43	220	22	21	4	2
Health education	1	29	162	21	16	4	0
Medical advisory service	3	68	206	28	25	5	3
Clinical laboratory *	2	66	138	27	12	2	1
X-ray *	1	73	151	36	17	3	2
Physiotherapy *	1	46	145	29	15	1	2
Dental service	0	7	24	9	5	2	0

* In the plant or readily available.

Industrial health services according to this evidence have proved to be most advantageously developed in large plants. In all classifications according to size, however, there are any number of opportunities for useful medical activity in a relatively unexplored field. Many of the small plants which have comparatively unsatisfactory accident and occupational disease experience will look to the medical profession for guidance and assistance. Such demands ought to be anticipated through education applied to physicians everywhere. There is a definite place for the physician in every industrial plant, large or small. Until industry and labor are taught to recognize that place and to realize the value of intelligent health conservation, the full potentialities of industrial health as a contributor to community and national welfare will not be realized.

INDUSTRIAL HEALTH ACTIVITIES IN ORGANIZED MEDICINE

All of the official agencies in organized medicine have exerted direct or indirect influences on the standards and procedures of industrial medical practice. One of the useful functions of the Council on Industrial Health will be to coordinate these activities as well as to point out to physicians the functions of extraprofessional groups and associations which take an interest in the health of the worker.

The growing interest in industrial health is demonstrated by the increased space assigned in THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION directly to items indexed under the titles of industrial medicine and workmen's compensation, jumping from thirty-eight references in 1920 to 164 in 1938. This subject matter refers to original articles, editorials, queries and minor notes and abstracts and has no reference to the large amount of additional information in THE JOURNAL directly applicable to improved industrial medical standards. Other agencies in organized medicine have made valuable contributions to professional understanding of social and medical values in industrial health. Workmen's compensation legislation has periodically been surveyed, beginning with the investigation by the Judicial Council in 1915 and since by that agency as well as by the Bureau of Medical Economics. Since its creation, the Bureau of Legal Medicine and Legislation has kept closely in touch with the developments in the field of workmen's compensation legislation. It has advised state associations with respect to such legislation, urging, among other things, that injured employees be given the right to choose the physicians who treat their injuries, and has exerted its influence to the end that only scientific medical care be made available to injured workmen. The Bureau has also followed the trend of judicial decisions relating to workmen's compensation and abstracts the more important decisions for publication in the medicolegal columns of THE JOURNAL. A Committee on Industrial Sanitation was appointed in 1915 by the Section on Preventive

Medicine and Public Health, which reported in the following year that the great mass of workmen had been denied the opportunity of enjoying healthful living and working and predicted a large field of opportunity open to the physician in the industrial field. The scope of activity which physicians could profitably engage in was outlined by this committee and includes substantially all the functions now considered applicable to present day industrial medicine. Discussions of industrial medical problems have been so continuously presented in that section since that industrial medicine shortly came to be included in its title. The Bureau of Health Education has furthered the cause of physical examination in industry through the development of health examination forms and a physical examination manual. The Council on Physical Therapy has engaged in investigations of resuscitation equipment, artificial limbs and estimations of disability from hearing loss, following to some degree the fundamental work of the Section on Ophthalmology relating to disability from visual loss. Other councils and bureaus have exerted a less direct but important influence in industrial medical standards. The ethical code takes on real significance when applied to medical service for industrial wage earners. The condemnation of quackery and cultism benefits industry as well as the general population. Industrial medicine benefits by every improvement in undergraduate teaching, postgraduate medical instruction, adequate standards of hospital training, licensure and specialist certification. All these activities represent contributions by organized medicine to improve medical care for the whole population and visualize, therefore, in no small degree, that the industrial worker will be one of the principal beneficiaries.

Activities in State and County Medical Associations.—Early in the development of the Council on Industrial Health a policy was adopted regarding its relationship to state and county medical societies in the following terms:

> Contact should be made with the several state medical societies, urging them to create committees on industrial health which will proceed at once to study the problems in this field in their respective communities. The organization of committees should be extended as far as practicable to the county medical societies. These committees should be urged to investigate the present activities within their states of the several agencies interested in industrial health, as well as the proposals for industrial legislation which are being presented to various legislatures. Educational programs should also be sponsored under the auspices of these committees.

Early investigation showed that, while a fair percentage of the states had formed committees dealing with certain aspects of industrial health, centralization of responsibility was largely absent and functions, were in many instances distributed through several committees, such as public policy and legislation, economics, contract practice and workmen's compensation, all of whom might act independently on economic, ethical or clinical matters relating to industrial health.

The evident need for coordination of activities under a definite program has appealed to a majority of the state medical associations. At the present time thirty-four of the state medical associations have formed committees on industrial health or indicated existing committees through which the Council can act in its efforts to clarify the objectives of industrial health and to elevate its standards. The committees and chairman of each are listed in table 10.

A program of activities for these committees has been formulated with the following objectives:

1. Train physicians to recognize and report occupational disease.
2. Train industry and labor to the value of industrial health conservation.
3. Elevate medical relations and standards under workmen's compensation.
4. Scrutinize all social legislation affecting industrial health.
5. Clarify relationships between industrial and private practitioners.
6. Improve relations between physicians and insurance.
7. Establish working relationships with all state agencies interested in industrial health.

TABLE 10.—*Committees on Industrial Health in State Medical Association*

State	Committee	Chairman
Arizona	Industrial Relations Committee	Dr. Robert Kennedy
California	Committee on Industrial Practice	Dr. Donald Cass
Colorado	Committee on Industrial Health	Dr. S. B. Potter
Connecticut	Committee on Industrial Health	Dr. Clifford Kuh
D. C.	Committee on Industrial Medicine	Dr. Edgar McPeak
Florida	Committee on Representatives to Industrial Council	Dr. A. H. Weiland
Georgia	Committee on Industrial Relations	Dr. C. F. Holton
Idaho	Committee on Industrial Medicine	Dr. E. N. Roberts
Illinois	Occupational Disease Committee	Dr. P. H. Kreuscher
Indiana	Committee on Occupational Diseases	Dr. C. V. Rozelle
Iowa	Committee on Industrial Health	Dr. E. J. Harnagel
Louisiana	Committee on Industrial Health	Dr. S. C. Lyons
Maryland	Committee on Industrial Health	Dr. Raymond Hussey
Massachusetts	Committee on Industrial Health	Dr. W. Irving Clark
Michigan	Committee on Occupational Disease and Industrial Hygiene	Dr. Henry Cook
Minnesota	Committee on Industrial Hygiene and Occupational Diseases	D. J. L. McLeod
Missouri	Committee on Industrial Health	Dr. E. C. Funsch
Montana	Committee on Industrial Hygiene	Dr. L. T. Sussex
Nevada	Committee on Industrial Health	Dr. R. A. Bowdle
New Jersey	Committee on Industrial Health and Hygiene	Dr. J. I. Fort
New York	Committee on Industrial Dermatoses	Dr. E. F. Traub
North Carolina	Committee on Industrial Health	Dr. H. F. Easom
Ohio	Committee on Workmen's Compensation	Dr. D. B. Lowe
Oklahoma	Committee on Industrial Service and Traumatic Surgery	Dr. O. S. Somerville
Oregon	Committee on State Industrial Affairs	.....
Pennsylvania	Committee on Industrial Health	Dr. C.-F. Long
Rhode Island	Committee on Industrial Health	Dr. Charles Gormley
South Dakota	Committee on Industrial Health	Dr. R. W. Mullen
Tennessee	Committee on Industrial Hygiene	Dr. C. E. Newell
Texas	Committee on Industrial Health	Dr. Ross Trigg
Utah	Committee on Industrial Health and Hygiene	Dr. J. P. Kerby
Virginia	Committee on Industrial Health	Dr. F. J. Wampler
Washington	Committee on Industrial Health	Dr. H. T. Buckner
Wisconsin	Committee on Industrial Health	Dr. S. J. Seeger

Feeling that some effective means of interchange of ideas between the Council and the state committees other than correspondence would enhance organization, provide uniformity of action and stimulate wider initiative, a bulletin has been developed through which it is hoped objectives will be more rapidly realized.

Already certain county medical societies are beginning to organize committees of their own to provide for proper medical leadership in respect to health measures designed for employed groups. These developments are of first importance, since it is in the county medical society that problems of industrial health are encountered earliest and where they are most directly dealt with. The functions of investigation, correlation and education which characterize the programs of the Council on Industrial Health and of the committees on

industrial health in the state medical associations are susceptible of extension into county units. Although no fixed formula can be established for county society activities because of the wide variety of local conditions, it is felt that the three classifications of activity that have been mentioned are flexible enough for general need and yet provide a basis for reasonable uniformity and consistency.

INDUSTRIAL HEALTH IN THE GOVERNMENT

As in the case of private medical practice, the scope and administrative procedures in workmen's compensation have determined the extent and characteristics of activities by governmental agencies directed at industrial health problems. Under forms of compensation benefits restricted to industrial accidents only, principal reliance came to be placed on state departments of labor or industrial commissions who created factory inspection services and issued regulations under factory acts designed to suppress unsafe practices and working conditions. As workmen's compensation widens and extends coverage to occupational diseases, the desirability for establishing more adequate forms of governmental control has begun to exert itself.

Exceptions to this general statement in the federal government are the United States Bureau of Mines and the United States Public Health Service, which separately and jointly have engaged in valuable industrial health activity for more than a quarter of a century. The United States Public Health Service, through its Division of Industrial Hygiene in the National Institute of Health, has contributed greatly to administrative standards of industrial hygiene through its program of research, education and cooperative services. The Division of Labor Standards in the United States Department of Labor was established in 1934. It is designed to formulate codes of safe procedure under model laws which the individual states may adopt. One of its most valuable contributions has been the establishment of regional training schools for factory inspectors.

Industrial hygiene activity in state governments has been greatly expanded recently by assistance available under the Social Security Act of 1935. Under the guidance of the United States Public Health Service this work has developed in three principal directions:

1. Administrative functions concerned with coordinating all activity undertaken by federal, state and unofficial agencies.
2. The extension of industrial hygiene units in state and local health departments.
3. Studies and investigations carried on by the laboratory and field sections of the Division of Industrial Hygiene.

All these activities are carried out cooperatively with health departments, with industry, with physicians and with other organizations. The accompanying table lists the industrial hygiene bureaus now incorporated in state governments. Two are assigned to state departments of labor in New York and Massachusetts. In addition to those listed, bureaus have been developed in a number of city and county health departments. Essentially, however, the functions of bureaus of industrial hygiene are identical and include:

1. Consultation with plant management regarding needed corrections of environmental conditions.
2. Advice to the management and medical supervisor as to the relative toxicity of materials or processes, and advice concerning new materials prior to their introduction into the industry.
3. Assistance in developing, maintaining and analyzing absenteeism records.
4. Consultant service to medical supervisors, private physicians, compensation authorities and other state agencies regarding illness affecting workers.
5. Provision of necessary laboratory service of both a clinical and a physical nature.
6. Integration of the activities of other public health bureaus in their programs for workers; for example, the control of cancer, syphilis and tuberculosis.

Determinations of the scope and nature of industrial health problems in any locality are necessary to indicate

TABLE 11.—*Industrial Hygiene Bureaus in State Governments*

State	Department Responsible	Department Head	Personnel: Medical	Personnel: Engineers	Personnel: Technical	Personnel: Clerical	Preliminary Hygiene Surveys: Completed	Preliminary Hygiene Surveys: Published	Preliminary Hygiene Surveys: In Progress	Date of Establishment
Alabama	Health	J. R. Cain, M.D.	1	0	0	0	..	..	*	1937
California	Health	J. P. Russell, M.D.	1	2	1	2	..	..	*	1937
Connecticut	Health	A. O. Gray, M.D.	1	2	2	2	..	..	..	1928
Idaho	Health	A. F. Galloway, M.D.	..	..	..	..	..	*	..	(1)
Illinois	Health	M. H. Kronenberg, M.D.	3	2	4	2	..	*	..	1938
Indiana	Health	L. W. Spolyar, M.D.	1	1	0	1	..	*	..	1938
Iowa	Health	A. H. Wieters	0	1	1	1	*	..	..	1937
Kansas	Health	E. Boyce	0	1	1	1	*	..	..	1937
Maryland	Health	J. M. McDonald, M.D.	1	2	3	2	..	*	..	1936
Massachusetts	Labor	M. Bowditch	0	1	2	2	..	..	..	1934
Michigan	Health	K. E. Markuson, M.D.	2	5	0	3	*	..	..	1936
Minnesota	Health	A. F. Chesley, M.D.	..	..	..	..	..	..	..	(1)
Mississippi	Health	J. W. Duggar, M.D.	1	0	1	1	..	..	..	1939
Missouri	Health	W. S. Johnson	0	3	0	1	..	..	..	1938
Montana	Health	W. F. Cogswell, M.D.	..	..	..	..	..	..	..	(1)
New Hampshire	Health	F. J. Vintinner	0	1	0	1	..	*	..	1938
New York	Labor	L. Greenburg, M.D.	7	7	12	7	..	..	..	1913
North Carolina	Health	T. F. Vestal, M.D.	2	2	1	1	..	..	..	1935
Ohio	Health	K. D. Smith, M.D.	3	1	2	2	..	*	..	1913
Pennsylvania	Health	W. B. Fulton, M.D.	2	0	0	3	..	..	..	1938
Rhode Island	Health	C. L. Pool	1	2	2	1	*	..	..	1939
South Carolina	Health	H. F. Wilson, M.D.	1	1	0	1	..	*	..	....
Tennessee	Health	Crit Pharris, M.D.	1	1	0	0	..	..	*	1937
Texas	Health	C. A. Nau, M.D.	1	2	1	1	..	*	..	1939
Utah	Health	J. L. Jones, M.D.	1	0	0	0	..	*	..	....
Vermont	Health	H. W. Slocum	1	1	0	1	..	..	..	1938
Virginia	Health	R. T. Homewood	0	1	1	1	.	*	..	1938
West Virginia	Health	A. McChe, M.D.	1	2	1	1	..	..	..	1938
Wisconsin	Health	Paul Brehm, M.D.	1	2	1	1	..	..	..	1937

(1) Personnel now being established.

the kind, magnitude and direction of work to be undertaken. Most of the industrial hygiene units in state health departments are now in the process of conducting or have recently completed preliminary industrial hygiene surveys. Fundamental information of this character provides a basis for extensive education of industrial officials and physicians in order to secure reliable reports on absenteeism due to occupational disease and other illnesses. Representatives from divisions of industrial hygiene in the state and federal governments constitute the National Conference of Governmental Industrial Hygienists, the objectives of which are to promote industrial hygiene and sanitation in all its aspects and to coordinate these activities as conducted by governmental units. Annual meetings are conducted to accomplish these purposes.

INDUSTRIAL MEDICAL EDUCATION

The training which physicians receive in industrial health could be greatly improved. This fact has made it necessary to investigate the availability of educational facilities in industrial health and to determine the possibilities for expansion. The tabulations and discussion which follow represent an attempt by the Council on Industrial Health to determine whether the medical profession has been hampered in its relationship to a useful and growing segment of medical enterprise through negligent emphasis on undergraduate and postgraduate teaching programs.

Few practitioners in present day industrial medicine have had opportunity for formal education. Varying degrees of proficiency have been attained through personal experience or apprenticeship. Such traditional methods are successful in medical education until information has been assembled, special technics elaborated and precise knowledge accumulated sufficient to establish a special field of medical interest. When that point is reached, experience demonstrates that organization of instruction leads to more efficient preparation. Time is saved, the spread of authentic information is greater, the interests of patients are more adequately safeguarded and, in general, the gap between knowledge and practice is materially reduced.

Industrial health as practiced today is not a restricted field. In this respect it resembles all other special provinces of medical interest. Physicians engaged in industrial practice in a limited way believe that any one with good basic medical equipment can successfully conduct an industrial practice with certain adaptations which are to be gained largely through experience. A contrary point of view is expressed by those engaged in industrial practice full time, who state that industrial health requires a degree of preparation on the part of those who elect to serve therein quite as exacting as to be found in any other specialty. Furthermore, they contend that successful industrial medical specialization demands additional proficiency mainly in the field of administrative practice.

Obviously, the educational requirements for these two groups are dissimilar; but, if growing demands on the profession are satisfactorily to be met, most practitioners will need some training in industrial health to establish competence and some practitioners will need a great deal, in keeping with the varying situations and circumstances under which industrial practice occurs.

PRESENT STATUS OF UNDERGRADUATE TEACHING

The importance of acquainting medical students with the fundamentals of industrial hygiene is rarely questioned by those in charge of teaching preventive medicine in medical schools. There are always difficulties associated with substantial alterations of or additions to teaching schedules. Table 12, representing data collected by the Council on Industrial Health, indicates

TABLE 12.—*Required Instruction in Industrial Hygiene Provided by Medical Schools, 1939-1940*

Medical School	Lectures (Clock Hours)	Field Trips
College of Medical Evangelists	1	3-5
University of Southern California	1-2	*
Stanford University	5-6	None
Yale University	3	1
Georgetown University	3	3
George Washington University	3	None
University of Georgia	3	6
Loyola University	2	None
Northwestern University	12	None
University of Chicago	5	None
University of Illinois	18	None
Indiana University	3	1
State University of Iowa	2	2
University of Kansas	1-2	None
University of Louisville	5-8	2
Louisiana State University	1	None
University of Maryland	5	1
Boston University †	7	1
Harvard Medical School	6	None
Tufts College	7	None
University of Michigan	4	None
Wayne University	8	None
University of Minnesota	3	None
St. Louis University	6	None
Washington University	3	None
Creighton University	7	1
University of Nebraska †	1	None
Albany Medical College	2	None
Long Island College of Medicine	7	2
University of Buffalo	5	1
Columbia University	5	None
Cornell University	3	1
New York Medical College	3	3-4
New York University	3	None
University of Rochester †	4	1
Syracuse University	2-3	1
Duke University	1	1
University of Cincinnati	6	None
Western Reserve University	3	None
Ohio State University	10	None
Jefferson Medical College	8	*
Temple University	3	*
University of Pennsylvania	3-4	None
Woman's Medical College	22	3-4
University of Pittsburgh	16	1
Medical College of State of South Carolina	1	1
University of Tennessee	3	3
Meharry Medical College	6	None
Vanderbilt University	2	2
University of Vermont	8	1
University of Virginia	5-10	1
Medical College of Virginia	12	7

* Sanitary survey.
† Information received for the academic year 1938-1939.

that adequate presentation of industrial hygiene to undergraduates is by no means impossible. Given proper leadership and organization, industrial hygiene can occupy a position of real significance in the time devoted to preventive medical teaching. Industrial hygiene is a function of preventive medicine in most of the medical schools. This relationship is of considerable interest, since such backwardness as industrial hygiene has displayed in attracting the attention of medical educators is a reflection of the difficulties encountered in the teaching of preventive medicine and

public health methods as a whole. As improvement occurs in this larger field, the impression prevails that industrial hygiene will come in for its own share of augmented representation.

Reports have been received on the present status of undergraduate teaching in industrial hygiene from all of the approved four year medical colleges. Fifty-two medical schools shown in table 12 are able to report quantitatively the time assigned to required instruction in industrial hygiene. Six schools are unable to report in this fashion because of the difficulty of applying a numerical value to the industrial hygiene content of conjoint courses, seminars and related preventive medical teaching. Nine schools in which no organized instruction in the subject is given are also omitted from the table. The average allotment of time devoted to industrial hygiene in the listed schools is slightly in excess of five hours. Actually, of the fifty-two schools providing some instruction, twenty exceed this average figure and thirty-two fall below it, the variability

TABLE 13.—*Elective Courses in Industrial Hygiene in Medical Schools*

Medical School	Lectures (Clock Hours)	Field Trips	Laboratory Work (Clock Hours)
Stanford University	24	4-6	8-10
Yale University	30	3	None
Georgetown University	24	3	None
University of Illinois	22	6	4
Johns Hopkins University	*	..	.....
Harvard Medical School	*	..	.....
University of Michigan	*	..	.....
Washington University	None	3	None
Columbia University	*	..	.....
New York University	None	**	**
University of Pennsylvania	12	1-2	None
Medical College of Virginia	...	***	.....

* Electives available in graduate industrial hygiene courses.
** 160 hours combined field trips and laboratory work.
*** One month full time in an industrial medical department.

extending from one hour of didactic work to as much as twenty-two hours of lectures, associated clinics and demonstrations.

Required laboratory exercises especially in industrial pathology or physiology are omitted from the tabulation, since experience of this type is provided in only four of the medical schools. Field trips which must be considered in the same ratio of importance to industrial hygiene teaching as bedside demonstrations are to clinical medicine and surgery are required in twenty-seven schools. The most effective procedure has usually taken the form of visits to industrial medical services. Another arrangement is to include an investigation of industrial hygiene as part of a required general sanitary survey by each student. In either case the satisfactory nature of the experience is predicated on the degree of supervision exercised, the character of follow-up reports and the presence or absence of associated seminars. In certain schools this phase of the teaching is admirably done. Elsewhere the value of current practices has been seriously questioned.

Table 13 lists the twelve medical schools which offer optional courses in industrial hygiene, all offered by departments of public health and preventive medicine. In several schools, electives are available in other components of industrial health provided by departments of general medicine, surgery, toxicology and orthopedics. In a few others, clinical experience of a combined medical-surgical type is made available through industrial outpatient dispensaries. As noted in the case of required instruction, considerable variation exists in the elective courses, ranging from thirty hours of didactic work, field trips and laboratory exercises to elective field trips alone. The degree of student interest also may vary considerably. Elective courses have developed on the basis of student demand. Others have been offered for a number of years with practically no registrants.

CORRELATING EXPERIENCE IN OTHER TEACHING DEPARTMENTS

In many of the medical schools the claim is properly made that lack of emphasis on industrial hygiene in separately conducted preventive medical courses should not be the sole standard by which the adequacy of teaching industrial health as a whole is measured. The basis of this argument rests on the fact that industrial health is a composite of contributions from nearly every other teaching discipline in medical education and its complete presentation is possible only through appropriate experience supplied by departments of surgery, medicine, dermatology, radiology, toxicology and medical jurisprudence. In fact, it has been suggested that the application of preventive methods should not be segregated in separate courses but should form an integral part of the instruction which medical students receive in all clinical courses. Valid as these contentions are, evidence is accumulating that adequate coverage of industrial health is an unusual accomplishment under systems of divided and unrelated responsibility, unless the task of suitable correlation is lodged in one or another of the component teaching units. It is thought that correlation of this character could effectively be undertaken by those in charge of preventive medicine and public health departments, since the educational content of these courses likewise supplies a substantial increment to industrial health training. The essentials of personal and physiologic hygiene, nutrition and housing, vital statistics, general sanitation and control of communicable diseases are all directly applicable. Certainly organization of instruction along these lines should correct to some extent the charges that medical problems surrounding the health of the workers are not adequately presented and that instruction in common occupational health exposures is available only as typical cases happen to be admitted to wards or clinics. It should serve also to reduce the number of complaints relating to inadequacy of training in the care of traumatic injuries, in occupational dermatitis and in industrial toxicology and jurisprudence.

Separate departments of industrial hygiene have been created at the University of Pittsburgh School of Medicine and at the University of Colorado Medical School in the expectation that this type of organization presumably will provide a different but successful solution to teaching industrial health more adequately. Important as such developments may be in undergraduate teaching, greater significance resides in the specialized teaching talent which can be attracted under such a plan, particularly if graduate programs are under consideration.

As the advantages of this type of organization become apparent, other medical schools may follow suit. In fact, such plans have already been contemplated at a number of teaching centers.

CONTACT OF THE PROFESSION WITH INDUSTRIAL HEALTH

Lack of emphasis on occupational problems is accounted for in some medical schools on the assumption that proficiency in industrial practice should be a function of graduate medical education as in the case of any other medical or surgical specialty. This point of view fails to consider the early contact which recent graduates establish with practical industrial medicine, similar in every respect to problems they encounter falling within the scope of other specialties the fundamentals of which are taught in clinical courses. Recent graduates of approved medical schools listed in the American Medical Directory as engaged in general practice have reported to the Council on Industrial Health that nearly 60 per cent are introduced to industrial medicine and surgery very promptly in their professional careers. Almost none of them have had any opportunity to undertake postgraduate training beyond such fortuitous experience as they may have received as house officers in hospitals. Table 15 presents information received from this group of recent medical graduates calculated to determine their appraisal of the adequacy of training in certain components of industrial health. The replies, while they have small value in reference to the adequacy of training received in individual schools, do provide an index to the competence of the average recent graduate to undertake industrial practice. The majority feel that, while first aid surgery and principles of resuscitation are adequately taught, they are not quite so sure about the commoner industrial health hazards. With respect to industrial toxicology, industrial dermatosis, standards of ventilation and illumination, principles of workmen's compensation and casualty insurance relationships, the majority of recent graduates feel that these subjects are inadequately treated and in that descending order. These replies are a direct commentary on the reliability of contributions to industrial health experience provided by unrelated clinical departments without necessary planning and organization. They also refute the attitude that instruction of medical students in industrial health is not practical and that such teaching has no direct bearing on competence in the general practice of medicine.

AVAILABILITY OF TEACHING TALENT AND CLINICAL MATERIAL

Another explanation provided by certain of the medical schools for inability to develop suitable teaching programs in industrial health refers to the lack of available teaching talent and clinical material. This is particularly true of schools located in nonindustrial areas. Information sought and obtained from a substantial list of physicians in charge of industrial medical departments questions this point of view with respect to most sections of the country. The majority of replies from this source express the belief that recent graduates as a rule are not well prepared to contribute promptly and properly to medical control of working people. The principal criticisms of recent recruits to industrial medicine, aside from almost complete absence of any previous contact with industrial problems, fall in four main classifications:

1. Inability to adjust to the medical control of groups.
2. Poor insight into preventive practice of all types.
3. Almost no conception of disability evaluation.
4. Little conception of the contribution which physicians can make to personnel relationships in industry.

In the opinion of these industrial medical directors, most of the difficulties can be laid at the doors of medical schools as they have failed to use industrial facilities to extend the knowledge of medical students along industrial lines. The majority express the feeling that these facilities are readily available in nearly every locality and ought to be freely used.

POSTGRADUATE EDUCATION IN INDUSTRIAL HEALTH

Much more fault ordinarily is found with the lack of adequate graduate opportunities in industrial health than deficiencies in the undergraduate curriculum. In consideration of the degree of industrialization involved, little interest has been exhibited in this country toward the development of centers of advanced training in industrial practice. The meager record may be reported under the following headings:

University Programs.—Existing opportunities for advanced instruction have developed in the same way noted in the discussion of undergraduate teaching as part of the larger field of preventive medicine. Since most of these opportunities are designed for candidates interested in higher public health degrees, there has been little disposition to distinguish between such educational

TABLE 14.—*Schools Providing Advanced Industrial Hygiene Instruction Available to Medical Graduates*

Massachusetts Institute of Technology
Yale University School of Medicine
School of Hygiene and Public Health of Johns Hopkins University
Harvard University School of Public Health
De Lamar Institute of Public Health of Columbia University College of Physicians and Surgeons
Loyola University School of Medicine
Graduate School of University of Pennsylvania
University of Michigan Medical School
University of California School of Medicine

requirements and those needed to turn out a well trained plant medical director. The necessary basic information may be identical in all cases but the practical superstructure might be somewhat different. In any event, physicians may be deterred from undertaking further training in industrial health if the only means for so doing involve registration for all courses leading to certification or a degree in public health.

Table 14 lists those schools which report industrial hygiene as a component of advanced courses in public health and preventive medicine. Two of them are in schools of public health; the remainder are associated with advanced public health training either in medical or in graduate schools. A great deal of variation exists in the amount of time devoted to industrial hygiene and the availability of suitable clinical material just as in the case of the undergraduate schools. In certain of these schools it is possible to plan an individual program for the capable graduate student adjusted more or less to his needs and interests both as to time and as to content.

The number of short continuation courses under university auspices is likewise strictly limited. Efforts along these lines have been successful at Buffalo, Northwestern, Wayne, the New York Postgraduate School and Pittsburgh universities, the latter in conjunction with the county medical society.

Nevertheless there are some encouraging prospects for a substantial growth in university controlled gradu-

ate courses in industrial health in the near future. Most of these plans depend on the augmentation of teaching programs in public health departments. In one or two instances, plans are being undertaken to organize institutes of industrial health open to a variety of candidates including graduate medical students. The opportunities available under such an arrangement would appear to come closer to meeting the needs of the practitioner interested in a plant medical service than has yet been attained.

Special Professional Societies and Organizations.—The special professional societies in the field of industrial medicine and surgery have made very effective contributions toward the dissemination of reliable information in the field of industrial medicine and surgery. Benefits derived by the membership do not extend to private practitioners who provide the greater part of medical service in industry, except as they have access to official publications and proceedings. Such organizations as the American Association of Industrial Physicians and Surgeons and its component societies, the industrial sections of the American Medical Association and the American Public Health Association, the National Safety Council, the clinical conferences of the American College of Surgeons, railway surgical societies and members of district, state and local bodies fall into this category.

TABLE 15.—*Replies of Recent Graduates on the Adequacy of Training in Certain Components of Industrial Health*

Components of Industrial Practice	Adequate	Inadequate	No Answer
First aid surgery	131	46	4
Resuscitation	130	58	3
Common industrial hazards	98	79	4
Personal hygiene of workers	79	98	4
Industrial toxicology	74	102	4
Industrial dermatoses	71	106	4
Ventilation and illumination	67	109	5
Workmen's compensation	35	143	3
Casualty insurance relationships	23	153	5
	Yes	No	No Answer
Hospital experience improved acquaintance with industrial medicine	114	62	5
Any special studies undertaken	13	160	8

In addition, independent organizations have over a period of years arranged for special seminars on industrial health topics. Typical examples are the Saranac Symposiums on Silicosis and the meetings of the Air Hygiene Foundation. The United States Public Health Service has also supplied training for the benefit of personnel in industrial hygiene units of state boards of health.

State and County Medical Societies.—The survey of postgraduate medical education conducted by the Council on Medical Education and Hospitals of the American Medical Association indicates that industrial health has received almost no consideration as a topic for presentation. Traumatic surgery is the only component which has aroused any considerable interest. In a series of answers submitted by 479 industrial physicians, 165 report that their county medical societies devote time to discussions of industrial health. Nevertheless it is safe to say that on the whole there has been little organized effort to acquaint the practicing profession with best methods to improve the physical and environmental status of workers.

Considerable improvement is looked for in this respect. The Council on Industrial Health has inaugurated an annual congress on industrial health which will serve to acquaint the practicing profession with current developments in this field. These congresses will be supplemented by postgraduate educational programs in the state societies under the stimulus of the committees on industrial health in the constituent organizations. It is expected also that as these plans materialize there will be greater attention to industrial medical affairs in county medical society meetings and committee deliberations. In this way a fuller realization of the importance of industrial health will be provided the organized medical profession or at least there will be an opportunity to arrive at accurate conclusions as to why there is lack of interest and the best means of combating it.

Internships, Residencies and Fellowships. — The degree to which hospital experience augments acquaintance with industrial medicine is reported in table 15. One hundred and five, or 67 per cent, of recent graduates reached by questionnaire have stated that their knowledge of occupational health problems was improved by hospital training. These additions to industrial health knowledge probably occurred with few concerted attempts on the part of staff intern committees to organize the instruction. The opportunities available through hospital training have not received the attention which they deserve and the Council on Industrial Health will be interested in determining whether the available industrial clinical material in hospitals is diversified enough to be effectively used in these directions.

Hospital experience may also contribute to the training of industrial physicians by the residency method. There are only a handful of approved residencies bearing on industrial health, all falling in the field of traumatic surgery. If hospitals can supply contact with suitable clinical material both bed and ambulatory, and if such training can be combined with additional periods of laboratory experience for basic instruction in industrial pathology and physiology and with a period of controlled service in a well conducted plant medical department, the resulting product should be a very acceptable one to industry. Such a plan would have the effect of formalizing and organizing educational opportunities for graduates interested in industrial medical practice in a fashion which has served effectively in all other specialty programs and relieve the universities of the full burden of providing acceptable advanced instruction.

But few fellowships are reported except as they relate to specific problems of investigation in one or the other of the components of industrial health as, for example, air conditioning, fever therapy and chemical exposures. Social security fellowships have been available designed to enhance the qualifications of the present personnel in divisions of industrial hygiene in state boards of health. Appointments of this type deserve great extension if any considerable reservoir of teaching and investigative ability is to be developed. They offer an exceptional approach to a sound understanding of industrial health from the graduate teaching point of view provided the character of support and the necessity for original investigation do not narrow concepts so appreciably as to make adequate experience negligible outside the field of primary interest.

THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

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SATURDAY, FEBRUARY 17, 1940

MEDICINE IN INDUSTRY

Industry deals with men as well as with machinery and materials. Only recently, however, has industry begun to realize that the man who operates the machine and who fabricates the material is its most valuable asset. As this conviction grows, fostered by both manufacturing and trade associations, employers are beginning to look more and more to the medical profession for assistance in conserving the physical welfare of man power. Already medicine has, under a variety of circumstances and in all types of industry, so convincingly demonstrated its value in reducing lost time from preventable accidents and diseases that it has come to be considered quite as indispensable as any other of industry's maintenance functions.

Probably it will never be easy to bring to industry generally the advantages of medical and engineering control over unhealthful industrial exposures. Aside from those ordinary activities of medical service in industry usually included under emergency surgery, industrial hygiene and physical supervision, the essential functions of industrial medicine demand study of technologic changes and the introduction of new materials, and the development of methods of control. These difficult procedures require integration and coordination, functions which constitute for the profession at large the principal objectives of the Council on Industrial Health.

Of equal complexity is the problem of unequal distribution of medical service to industry. Large plants, on the whole, have found themselves in the best position to organize medical services. Yet, contrary to common impression, industry in this country is made up predominantly of small units. Ninety-seven per cent of all manufacturing concerns employ fewer than 250 men, and almost 70,000 of them employ five wage earners or fewer. In this segment of industry, accident and disease experience is thought to be less favorable on the whole than in large plants. In this same segment the principal medical service received is first aid and emergency surgery and care of compensable disability. From the point of view of preventive industrial medical service, the field of the small plant is almost unexplored. When it is found possible to extend qualified preventive medical assistance to such concerns, through the joint agencies of private practice and public health administration satisfactory to those who supply the service and to those who receive it, an achievement will have been recorded in which all elements in the medical profession can take lasting satisfaction.

CHRONIC INDUSTRIAL BENZENE POISONING

An important and valuable addition to our understanding of the nature of chronic benzene poisoning in industrial workers is furnished by a series of five papers [1] which recently appeared in the *Journal of Industrial Hygiene*. They come from the Labor Departments of Massachusetts and New York, and from the Massachusetts General Hospital and the Hospital of the Rockefeller Institute for Medical Research. To any physician who has flattered himself that he has a clear and well founded picture of this form of industrial intoxication, these papers will bring an unpleasant shock, for they cast doubt on many of the ideas that have been held in the past with regard to pathology, diagnosis, clinical course and susceptibility. Indeed, they leave the impression that here is a disease of decided variability, one which requires the most meticulous examination if a diagnosis is to be made in time to save life. Moreover, the failure to make an early diagnosis sometimes means death to the victim.

The picture of chronic benzene poisoning as generally conceived includes a typical aplastic leukopenia, with or without a marked anemia, thrombocytopenia, increased bleeding time, delayed clotting and complete absence of any regenerative forms, white or red, in the circulating blood. Necropsy reveals a hypoplastic marrow. No other form of blood disease can be attributed to the action of benzene. Women, especially young girls, are more susceptible than men and suffer more severely. Early benzene poisoning can be readily detected by a count, absolute and relative, of the white

1. The papers have been issued in monograph form and can be obtained from 55 Shattuck Street, Boston, price $1:
Chronic Exposure to Benzene (Benzol): I. The Industrial Aspects, Manfred Bowditch and Hervey B. Elkins, Division of Occupational Hygiene, Massachusetts Department of Labor and Industries, Boston.
Chronic Exposure to Benzene (Benzol): II. The Clinical Effects, Francis T. Hunter, Department of Medicine, Massachusetts General Hospital, Boston.
Chronic Exposure to Benzene (Benzol): III. The Pathologic Results, Tracy B. Mallory, Edward A. Gall and William J. Brickley, Department of Pathology and Bacteriology, Massachusetts General Hospital, and the Office of the Medical Examiner for Suffolk County, Northern Division, Boston.
Benzene (Benzol) Poisoning in the Rotogravure Printing Industry in New York City, Leonard Greenburg, May R. Mayers, Leonard Goldwater and Adelaide R. Smith, Division of Industrial Hygiene, New York State Department of Labor, New York.
The Hematological Effects of Benzene (Benzol) Poisoning, Lowell A Erf and C. P. Rhoads, Hospital of the Rockefeller Institute for Medical Research, New York.

blood cells or by Yant's test for urine sulfates. A concentration of not over 100 parts per million of benzene in the air may be considered a safe limit.

All these assertions are challenged, more or less positively, by these writers. To take the last first, Bowditch and Elkins state that the concentration should be kept down to 75 parts per million at the most but that even at this point susceptible human beings may develop severe, even fatal, poisoning, which means that there must be close medical, as well as factory, control. Hunter says "It is doubtful whether any concentration of benzene greater than zero is safe over a long period of time."

The classic picture of benzene aplastic anemia is found to be only one of the manifestations of this disease. Hunter, who reports the result of the blood examinations in eighty-nine cases and the clinical course in ten fatal and four nonfatal cases, states that chronic benzene intoxication may bring about polycythemia or anemia, leukocytosis or leukopenia, leukemia or leukemoid blood pictures (either lymphatic or myeloid), eosinophilia, megalocytosis or microcytosis, or the presence of immature marrow elements in otherwise normal blood. Mallory and his colleagues made fourteen necropsies and five biopsies on people exposed to benzene. They find that the picture in the bone marrow varies from severe hypoplasia to the most extreme form of hyperplasia with extramedullary hematopoiesis, hyperplasia being more common than hypoplasia. The hyperplastic activity in marrow and in other foci may in some cases be hard to distinguish from tumors. The most surprising feature in these two reports is the statement that two of the fatal cases showed not leukopenia but leukemia, one a case of acute myeloid leukemia and the other acute aleukemic leukemia. The necropsy results in both cases confirmed the clinical diagnosis. In the first case a nodule was found in the liver which proved to be a true leukemic tumor, displacing the liver cells. Mallory emphasizes the "neoplastic tendency" of the conditions in all the cases belonging to the hyperplastic types. Among the nine cases observed by Erf and Rhoads, treatment failed in only one, in which an acute myeloid leukemia developed, with death six months after. Here too the appearance at necropsy was characteristic. There are, therefore, three new cases of benzene leukemia added to the ten already reported in the literature.

The diagnosis of benzene poisoning in an early stage is not easy. Hunter's case histories show that the victim may reach an advanced stage before there are striking blood changes or clinical symptoms. Leukopenia is not the most frequent sign. Both Hunter's group and Greenburg's group find a fall in the red cell count, below 4.5 million, more trustworthy. In the twenty-nine cases examined in Boston, anemia was always present but leukopenia was absent in ten. Yet one of these was fatal. In the New York cases also leukopenia was absent in some of the early cases and also in some of the cases of severe involvement. Next in importance to the anemia the New York group places an increase in the size of the erythrocytes. These observers also note that thrombocytopenia may be present without prolonged bleeding and delayed clot retraction. The Boston group lays stress on a decrease in the polymorphonuclear percentage, which is a better index of early poisoning than either leukopenia or an absolute polymorphonuclear decrease.

Yant's test for decrease in the proportion of inorganic to organic sulfates in the urine was used by Bowditch and Elkins, who found a striking difference between forenoon and afternoon specimens. The normal ratio fell as the day went on, to rise again slowly during the course of the evening. They found it a valuable test for benzene absorption.

Hunter says that he did not find any evidence that women are more seriously injured by benzene than men. Mallory says that among his sixteen cases of severe poisoning there were twelve men and four women. Ten of the men showed marrow hyperplasia and only two aplasia, while all four women showed aplasia, which suggests that there is a tendency of the male to react with hyperplasia, which may help to explain, since the hyperplastic form has not yet been generally recognized, the prevailing belief that women are more susceptible than men. His two patients with leukemia were men, and Erf and Rhoad's patient was a man. Of the ten cases reported in the literature, eight were in men.

THE PLATFORM OF THE AMERICAN MEDICAL ASSOCIATION

The American Medical Association advocates:

1. The establishment of an agency of the federal government under which shall be coordinated and administered all medical and health functions of the federal government exclusive of those of the Army and Navy.

2. The allotment of such funds as the Congress may make available to any state in actual need, for the prevention of disease, the promotion of health and the care of the sick on proof of such need.

3. The principle that the care of the public health and the provision of medical service to the sick is primarily a local responsibility.

4. The development of a mechanism for meeting the needs of expansion of preventive medical services with local determination of needs and local control of administration.

5. The extension of medical care for the indigent and the medically indigent with local determination of needs and local control of administration.

6. In the extension of medical services to all the people, the utmost utilization of qualified medical and hospital facilities already established.

7. The continued development of the private practice of medicine, subject to such changes as may be necessary to maintain the quality of medical services and to increase their availability.

8. Expansion of public health and medical services consistent with the American system of democracy.

Current Comment

THE SECOND ANNUAL CONGRESS ON INDUSTRIAL HEALTH

The Council on Industrial Health recently concluded the second of its annual congresses on industrial health. The meeting was attended by nearly three hundred leaders in industrial health, including representation from private and industrial practice, officers and members of committees on industrial health in state and county medical societies, directors of industrial hygiene and workmen's compensation in federal and state governments, insurance company officials, industrial and public health nurses, and lay executives and personnel officers of manufacturing enterprises interested in recent developments in the industrial health field. The character of attendance and the interest expressed testified to the need for a meeting of this character designed to clarify from time to time the scope, methods and objectives of all phases of medical practice in industry. Several suggestions were made by participants in the programs which seemed to warrant further exploration. One recommendation referred to the desirability of discussions leading toward closer collaboration in the physical and vocational rehabilitation of the industrially injured among representatives of organized medicine, workmen's compensation administration and rehabilitation agencies. The individual injured worker might profit considerably if all agencies designed to restore him to earning capacity worked together rather than at cross purposes, as all too frequently occurs under present uncoordinated conditions. Another suggestion was to the effect that the Council on Industrial Health should enlist the aid of appropriate sections in the Scientific Assembly of the American Medical Association to develop whenever possible uniform points of view about the relation of trauma to disease and also to inquire into the possibility of standardizing disability evaluation. The work of the Section on Ophthalmology in relation to disability rating for visual loss was cited as an example of what can be accomplished under proper interest and leadership.

THE RANDOLPH CASE

Newspapers in Philadelphia recently waxed well-nigh hysterical again about the case of an infant who died, it is said, not only because of failure to get a physician but because the physician ultimately reached failed to respond to the call. Now a calm, dispassionate investigation is reported in the *Weekly Roster*, bulletin of the county medical society. The baby, named Randolph, was 1 month old. The mother was delivered without a physician but with the assistance of a neighbor woman. The parents, who had four other children, had been on relief for the past five years. The mother observed at 8 a. m. that her baby was ill. At 8 p. m., according to the newspaper account, she sent to a neighbor's house for the father, who sent his two older children to get a physician. Walking through the cold after dusk on Sunday, these youngsters passed the homes of several doctors but, seeing no lights, passed by. They did not ring the door bells or knock. When the children returned two hours later, the mother had her daughter telephone the doctor who had been called when her delivery had already been facilitated by a neighbor. This doctor lived three miles away and had emergency work which would keep him busy for an hour. He urged the Randolphs to try the neighborhood physicians again. The mother now "walked" the baby until it went asleep. When she awoke at 12:40 a. m., the baby was white. She sent the husband for the police, who took the baby to the hospital, where it was pronounced dead. Apparently the mother had assumed that the physician who had attended her would drop all other cases regardless of their seriousness and come at once. She made no further effort to get a physician near her home. Actually he was busily engaged with two other emergency cases that might also have proved fatal. This fact the Philadelphia newspapers ignored. Philadelphia has 4,221 physicians, eighty-eight hospitals, more than 384,000 telephones and several directories of physicians; also a large number of adult persons who could run errands. Had the quest for a doctor been intelligently conducted by neighbors or other adults, a physician would have been obtained.

AMINO ACIDS OF CANCEROUS TISSUE

The search for chemical distinctions between normal and cancerous tissues has been diligently prosecuted in an effort to gain an insight into the factors involved in causing the rapid, unregulated growth of malignant tissue. The suggestion that several amino acids in malignant tissues occur as the unnatural stereo-isomers has been cited [1] as the first definite evidence of a qualitative difference in the metabolism of normal and malignant tissues. Now the accuracy of this initial evidence is questioned. Indeed, a recent investigation [2] has, by virtue of the specificity of the methods employed and the critical and controlled experiments conducted, quite conclusively demonstrated that the reported existence of large proportions of the unnatural stereo-isomer of glutamic acid or of other amino acids in malignant tissues cannot be correct. Employing a d-amino acid oxidase enzyme preparation which specifically deaminizes only the unnatural stereo-isomers of amino acids, a collaborative research by investigators of Cornell University and of the National Cancer Institute has studied the action of this enzyme preparation on hydrolysates obtained from purified protein preparations, from normal tissues and from a wide variety of malignant tissues. Although a small proportion (less than 3 per cent) of the unnatural stereo-isomers is found in all hydrolysates studied, significant differences were not observed in the relative concentrations of the unnatural forms of the amino acids in malignant tissues as contrasted with normal tissues or to purified proteins. Certainly the great importance initially attached to the type of spatial configuration of certain of the amino acids of cancerous tissue would appear to be unwarranted as far as the problem of the etiology or diagnosis of cancer is concerned.

1. Metabolic Characteristics of Cancerous Tissue, editorial, J. A. M. A. **113**: 596 (Aug. 12) 1939.
2. Lipmann, Fritz; Behrens, O. K.; Kabat, E. A., and Burk, Dean: Science **91**: 21 (Jan. 5) 1940.

ORGANIZATION SECTION

THE COMMITTEE OF PHYSICIANS FOR THE IMPROVEMENT OF MEDICAL CARE, INC.

REPORT SUBMITTED AT THE REQUEST OF THE EDITOR OF THE JOURNAL

The Committee of Physicians for the Improvement of Medical Care has been in existence about two and one-half years. Its origin, early history and purposes were described in articles which appeared in the *New England Journal of Medicine* (217: 843 [Nov. 18], 884, 887 [Nov. 25] 1937). A short article was also published in THE JOURNAL (March 12, 1938, p. 1418). Since then the committee has continued its activities in accordance with the principles and proposals which constituted its original platform.

The general objectives of the committee are set forth in the following quotation from its first statement:

> They [the members of the committee] hope that these principles and proposals may suggest the lines along which effort may be made by voluntary, local, state and federal agencies to improve medical care. It is recognized that the medical profession is only one of several groups to which medical care is of vital concern. . . . Nevertheless the medical profession should initiate any proposed changes because physicians are the experts upon whom communities must depend.

The purposes of the committee are further indicated by the following quotations from a statement issued May 5, 1939:

> The Committee has embarked on the second part of its work, the critical analysis of general or national movements toward the reorganization of medical care. . . . It is their [its members'] intention to subject to scrutiny and to expose to the light of public opinion, and more especially to the physicians of this country, projects or actions of government or of organized medical or lay groups. . . . They regard their functions as interpretative and educative. They appreciate the presence of all shades of opinion among those to whom they are responsible and have, consequently, tried to avoid arbitrary assertions. They have felt constrained to adopt an uncompromising attitude toward projects or measures that obviously violate the fundamental ends for which they have united, namely the protection and improvement of the quality of medical care. But they are equally solicitous that no systems be imposed of such uniform and stereotyped patterns that experiment and evolutionary development will be deterred. In fact they have proclaimed interest in education and investigation, establishment, maintenance and improvement of standards of competence and merit, the need for expert control, all features that are incompatible with static uniformity.

In this spirit the committee has issued, at intervals, the following statements: Aug. 8, 1938, Report of the National Health Conference; Nov. 26, 1938, Analysis of the National Health Conference and the program presented by the Interdepartmental Committee at that conference, with comments on the action of the House of Delegates of the American Medical Association (Sept. 16, 1938); May 5, 1939, The Wagner Bill (S. 1620) and Its Implications; Aug. 15, 1939, Proposals for Amendment of the Wagner Bill and an abstract of Senate Subcommittee Report (No. 1139) on Establishing a National Health Program.

The committee has repeatedly asserted the adherence of its members to the American Medical Association but has insisted that they and all individuals and groups have not only the right but the obligation to discuss freely any subject affecting medical practice, even if their opinions conflict with the policies and actions of those governing any medical organization.

The committee is now composed of thirty-one physicians. There are approximately 1,000 signatories to the Principles and Proposals and about 150 additional names are on the mailing list. Signature of the Principles and Proposals is not a prerequisite for being placed on the mailing list. The committee remains a self-appointed group. It has been incorporated as a non-profit corporation under the laws of Connecticut for the usual reasons of legal formality. The idea of more formal national organization with local chapters and democratic representation was considered and referred to the signatories but was not acted on for several reasons: the wish to avoid organization propaganda, the uneven distribution of the signatories, the cost involved, and the belief that such organization would give rise to the impression that the committee is working in opposition to and outside the ranks of the American Medical Association. Signatories have been invited to take the initiative, as individuals or as groups, in nominating persons for membership on the committee and suggesting or criticizing activities of the committee.

The work of the committee has been supported thus far by voluntary contributions from members of the committee and the signatories. Its expenses for the year July 1, 1938-1939, amounted altogether to about $2,500. The committee will be glad to mail to physicians who are interested copies of its statements, or to add their names to its mailing list.

Present members of the committee include:

Dr. Richard M. Smith, chairman	Dr. Channing Frothingham
Dr. Hugh Cabot, vice chairman	Dr. H. Rawle Geyelin
Dr. William J. Kerr, vice chairman	Dr. F. T. H'Doubler
Dr. Russell L. Cecil, honorary chairman	Dr. L. Emmett Holt Jr.
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GRADUATE MEDICAL EDUCATION

A PROGRESS REPORT OF THE FIELD STUDY ON GRADUATE MEDICAL EDUCATION IN THE UNITED STATES BEING CONDUCTED BY THE COUNCIL ON MEDICAL EDUCATION AND HOSPITALS

SOUTH CAROLINA

The South Carolina Medical Association has appreciated the necessity for some form of graduate education for the physicians of the state. It has been difficult for many of the physicians practicing in South Carolina to visit the leading medical centers elsewhere for a sufficient period for graduate study. For this reason a workable statewide program of extension training has been needed. Several plans have been tried and, while all have been of some service, not until recently has any one plan seemed to fit the need of the state.

In 1938 a cooperative program was developed between the Medical College of the State of South Carolina and the state board of health. A statewide course in obstetrics was given by the professor of obstetrics in the medical college. Twenty counties were visited from June to September 1938. Six meetings were held in each locality over a six weeks period. Two hours was devoted to illustrated lectures and clinics. Meetings were held in local hospitals whenever possible. Subjects included were treatment of abortions, placenta praevia and separation of the placenta, adequate antepartum care, toxemias of pregnancy, normal labor, operative procedures in obstetrics and puerperal care. Attendance totaled 196 physicians, health officers and nurses. There are 980 members of the South Carolina Medical Association of the 1,354 licensed in the state. No registration fee was charged for this instruction, since federal funds were utilized.

The Piedmont Postgraduate Clinical Assembly began in 1934 with clinical lectures by Dr. J. R. McCord, who visited six sections of the state under the auspices of the Children's Bureau of the United States Department of Labor. A permanent local organization followed, which had a broader scope. General medicine and surgery have been considered and a new aspect of medicine is stressed each year. Faculty members from medical schools of the South with South Carolina physicians conduct the three day program, which is designed to meet the needs of physicians practicing in South Carolina and neighboring states. A registration fee of $2 is charged. Attendance has averaged 100 physicians.

The office of the state medical association developed a library in 1938 so that members of the association might have library facilities in the state. Approximately 100 periodicals and 1,000 reference books in medicine are available.

Three sanatoriums in the state have offered conferences in tuberculosis for physicians. At Pinehaven Sanatorium, such conferences have been given annually. It is believed that fifty Negro physicians have taken some instruction in tuberculosis during the past few years.

MEDICAL LEGISLATION

MEDICAL BILLS IN CONGRESS

Bills Introduced.—S. 3266, introduced by Senator Hill, of Alabama, provides for pensions, compensation, retirement pay and hospital benefits to reserve officers of the Air Corps of of the Army who were called or ordered into the active military service with the Air Corps, Regular Army, by the federal government for extended military service in excess of thirty days on or subsequent to July 1, 1928, and who suffered disability in line of duty. S. 3269, introduced by Senator Mead, of New York, proposes to authorize a federal appropriation of $300,000,000 from which loans may be made to public bodies and nonprofit organizations for hospital, water, sewer, stream pollution control, and related projects and facilities. The bill provides that not exceeding $100,000,000 may be devoted to hospital projects. S. 3279, introduced by Senator Pepper, of Florida, proposes to increase from $3,500,000 to $4,500,000 the appropriation for vocational rehabilitation in order that needy disabled persons may receive aid in acquiring artificial appliances. S. 3318, introduced by Senator Sheppard, of Texas, proposes to authorize the appointment of female dietitians and female physical therapy aides in the Medical Department of the Army. H. R. 8289, introduced by Representative Wallgren, of Washington, proposes to authorize not to exceed $2,500,000 to enable the Secretary of the Interior to construct, equip and operate a hospital for the legally adjudged insane of Alaska. H. R. 8332, introduced by Representative Sumners, of Texas, proposes to prohibit the transportation of obscene literature in interstate or foreign commerce.

STATE MEDICAL LEGISLATION

Mississippi

Bills Passed.—The following bills have passed the house: H. 118 proposing to authorize the Board of Supervisors of Washington County to convey certain land to the city of Leland, on which the city of Leland is to erect a public health center and clinic; and H. 126 proposing to empower the board of supervisors of any county to acquire the necessary real estate and to expend any amount deemed necessary for the erection and maintenance of community public health centers and clinics used in connection with the syphilis eradication program sponsored by public health units of any county.

Bills Introduced.—SCR 6 proposes to create a committee to ascertain and compile full data and information pertaining to the state's charity hospital facilities. H. 174 proposes to authorize the boards of supervisors of the various counties to levy and collect an ad valorem tax not to exceed 2 mills for the treatment of the indigent sick, for the promotion of public health and for the support and maintenance of a full time county health department.

New Jersey

Bills Introduced.—S. 46 proposes to enact a separate chiropractic practice act and to create an independent board of chiropractic examiners to examine and license applicants for licenses to practice chiropractic. A license to practice chiropractic, the bill provides, confers on the licentiate the right to diagnose and to regulate the patient's dietary, sanitary and hygienic habits; to use the title "Doctor" or "Dr." when accompanied by "Chiropractic" or "Philosopher of Chiropractic" or "Master of Chiropractic," or their abbreviations, and to employ nurses; but it does not give the licentiate the right to practice medicine, surgery, obstetrics or osteopathy. A. 155 proposes to enact a separate naturopathic practice act and to create an independent board of naturopathic examiners to examine and license applicants for licenses to practice naturopathy, which the bill defines as "that system of the healing art which uses and prescribes the following practices and usages: diagnosis and the practice of the combined physiological, mechanical and material sciences of healing as taught in schools, institutes and colleges of naturopathy, which shall include physiotherapy, hydrotherapy, mechanotherapy, psychotherapy, phythotherapy, electrotherapeutics, corrective and orthopedic gymnastics, external applications, manipulation, and nutritional control." S. 64 proposes that 25 per cent of the receipts from motor vehicle licenses, from auto drivers' licenses and from gasoline tax receipts shall be set aside as a voluntary nonprofit general hospital fund, which is to be disbursed to voluntary nonprofit general hospitals in the state in proportion to the number of beds each such hospital has available for the use of indigent patients injured in automobile accidents.

New York

Bills Introduced.—A. 981 proposes to enact a separate chiropractic practice act and to create an independent board of chiropractic examiners to examine and license persons applying for

licenses to practice chiropractic. The bill proposes to define the practice of chiropractic as "the science of locating and the removing of nerve interference in the human body according to chiropractic principles, where such interference is indicated or misalignment or subluxations of the vertebral column appear. It excludes operative surgery, prescription or use of drugs or medicine, of the practice of obstetrics." A. 1005 proposes to repeal existing laws relating to the manufacture, sale, distribution and advertising of foods, drugs and therapeutic devices and to enact a so-called "Consumer's protection act" to regulate the manufacture, sale, distribution and advertising of foods, drugs, cosmetics and health devices. A. 1122 proposes to provide for the supplying at public expense of necessary medical, surgical and hospital care to persons, over 21 years of age, suffering from the after-effects of poliomyelitis, one half the cost to be borne by the county and the other half by the state. A. 1126 proposes to require a pharmacist, on the request of a person for whom he has filled a refillable prescription, to furnish that person a copy of it. A. 1181 proposes to make it a misdemeanor for any hospital, wholly or partly supported by public funds or exempt from taxation, to refuse to admit a private patient willing to pay for the facilities thereof, or to deny to a duly licensed physician or surgeon permission to attend or treat any such patient admitted to the hospital.

Rhode Island

Bill Introduced.—H. 658 proposes a system of compulsory health insurance, the benefits of which are to consist of cash and all forms of medical, dental, nursing and hospital service to be supplied to persons embraced in the compulsory features of the bill and to such others as elect to come under the bill.

Virginia

Bill Passed.—H. 7 has passed the house, proposing to prohibit the issuance of a license to marry unless both parties to a proposed marriage present a physician's certificate, which is not to disclose any medical finding, that he has conducted such tests or examinations as are required to determine whether there is evidence of syphilis. The bill proposes to require a physician to inform a person whom he has examined for the purpose of executing such certificate and in whom he has found indication as to the presence of syphilis, and the other party to the proposed marriage, the result of the test he has performed, the nature of the disease and the possibilities of transmitting it to the marital partner and to their children.

Bill Introduced.—H. 120 proposes to enact a separate chiropractic practice act and to create an independent board of examiners to examine and license applicants for licenses to practice chiropractic. The bill defines chiropractic "as the philosophy, science and art of locating, any method preparatory to, and the adjustment of the articulation of the spinal column and adjacent bony structure to release the transmission of nerve energy to all parts of the body to correct the cause of disease." The bill proposes to authorize a chiropractor "to use such methods as taught by chiropractic schools and colleges to further assist nature in establishing the normal transmission of nerve energy." Chiropractic, the bill continues, is not to include the use of operative surgery, obstetrics, osteopathy, nor the administration or prescribing of any drug or medicine. A certificate to practice chiropractic is to confer on the licentiate the right to practice chiropractic, to use such other sanitary and hygienic measures as may be incident to such practice, and to use the title "Doctor" or "Dr." in connection with his name when accompanied by the word "Chiropractor" or the letters D.C."

OFFICIAL NOTES

SPECIAL BLUE NETWORK BROADCAST

On February 21 from 9 to 9:30 p. m. central standard time (10 to 10:30 eastern standard time, 8 to 8:30 mountain time and 7 to 7:30 Pacific time) there will be a special broadcast by the American Medical Association and the National Broadcasting Company over seventy stations of the Blue network. The subject will be "Pasteur Conquers Rabies."

The broadcast will be based on an article entitled "Watch Your Dog!" appearing simultaneously in *Hygeia* and on official reports dealing with the seriousness of the rabies situation in the United States.

Special features of the program will be music arranged by Don Markotte of the National Broadcasting Company Music Library from the score which accompanied the motion picture based on the life of Louis Pasteur, starring Paul Muni. This music is made available through the special courtesy of Warner Brothers. An augmented N. B. C. orchestra, directed by Joseph Gallicchio, will render the music. Dramatizations taken from the life of Pasteur and arranged for radio by William J. Murphy will be enacted by a specially selected cast of N. B. C. radio actors, under the direction of J. Clinton Stanley, director of the series Medicine in the News.

A limited number of tickets for admission to the studio will be available to physicians in Chicago and vicinity. Tickets will be limited to two per application. Requests should be sent by mail to the Bureau of Health Education, American Medical Association, 535 North Dearborn Street, Chicago, enclosing a stamped, self-addressed envelop. Telephone requests cannot be received. Applications will be filled in the order in which they are received until all the tickets have been distributed.

WOMAN'S AUXILIARY

Louisiana

The auxiliary to the Calcasieu Parish Medical Society met in Lake Charles, October 20. Mr. R. F. Cisco spoke on the "Functioning of the By-Laws of the Association of Commerce." Arrangements were made for donations for Thanksgiving and Christmas food baskets for needy families. Also members were to assist the doctors in establishing the new library in St. Patrick's Hospital. Prizes will be given to children in the parish schools who write the best essays on a subject selected from *Hygeia*. At the November meeting Dr. Walter Moss gave an illustrated lecture on "Cancer Control." Dr. Claybrook Cottingham, president of Louisiana College, spoke on "World Events.' Mrs. S. M. Blakshear, president of the auxiliary to the Louisiana State Medical Society, spoke on "Organization and Cooperation" at a meeting of the auxiliary to the Rapides Parish Medical Society, Alexandria, November 10.

Nebraska

Mrs. J. E. M. Thomson, president of the auxiliary to the Nebraska State Medical Association, was guest of honor at the annual membership tea of the auxiliary to the Omaha-Douglas Counties Medical Society, Omaha, October 17. The auxiliary will place *Hygeia* in the public schools of these counties.

At a meeting of the board of directors of the auxiliary to the Nebraska State Medical Association in Lincoln October 16 Dr. A. L. Miller, president of the association, was speaker.

Texas

The Tom Green Eight County Auxiliary met in San Angelo October 2. Mrs. Frank Clark of Abilene discussed legislation. This meeting was attended by sixty-five women representing clubs in San Angelo.

Tennessee

Miss Ellen Graham, of Boonville, read a paper at a meeting of the auxiliary to the Lincoln County Medical Society in Fayetteville recently, entitled "The Life and Work of a Country Doctor," which was published in *The Journal of the Tennessee State Medical Association* and was written by Miss Graham's father, now deceased.

Medical News

(PHYSICIANS WILL CONFER A FAVOR BY SENDING FOR THIS DEPARTMENT ITEMS OF NEWS OF MORE OR LESS GENERAL INTEREST: SUCH AS RELATE TO SOCIETY ACTIVITIES, NEW HOSPITALS, EDUCATION AND PUBLIC HEALTH.)

ARIZONA

Psittacosis in Arizona.—Three cases of psittacosis have been reported in Tucson, according to *Public Health Reports*, January 12. Two young adults of one family became ill October 7 and November 7, respectively, and a nurse on the first case became ill November 3. The family owned two love birds, which had been shipped from a pet shop in California, April 21, 1939. However, other birds in the same group were examined with negative results, it was stated.

CALIFORNIA

Society News.—The San Francisco County Medical Society was addressed, February 13, by Frances Tomlinson Gardner, librarian, Crummer room, University of California Medical School, on "Pedro Prat, Surgeon of the Spanish Conquest" and Dr. Arthur W. Meyer, Stanford University, "Historical Ideas Regarding Conceptomaternal Relations."——Dr. Frank E. Adair, New York, addressed a joint meeting of the radiologic section of the Los Angeles County Medical Association and the Los Angeles Cancer Society, January 30, on "Management of Breast Cancer."——At a meeting of the Los Angeles Society of Neurology and Psychiatry, January 17, the speakers were Drs. May E. G. Romm on "Notes on a Case of Exhibitionism in the Male" and Leo J. Adelstein, "Neurologic Divining Rods and Their Localizing Value."——At a meeting of the Hollywood Academy of Medicine, February 8, Dr. Robert R. Newell, San Francisco, discussed "Medical Uses of Radiation and Growth of the Specialty of Radiology."

COLORADO

Sewall Memorial Lecture.—Dr. Chester S. Keefer, Boston, delivered the Henry Sewall Memorial Lecture before the Medical Society of the City and County of Denver, January 30. His subject was "Hemolytic Streptococcal Infections: Their Importance in Acute and Chronic Disease."

Plans for the Care of Pneumonia.—Typing stations have been established in various sections of the state and plans adopted to distribute serum and sulfapyridine through the state department of health in the care of indigent patients, according to the *Rocky Mountain Medical Journal*. The program conforms with similar plans now carried out in many states and has the approval of the committee on pneumonia of the Colorado State Medical Society.

DISTRICT OF COLUMBIA

Annual Banquet of University Medical Society.—Harold W. Ickes, Secretary of the Interior, will be the principal speaker at the annual banquet of the George Washington Medical Society, Washington, February 17, which concludes the annual postgraduate clinic of George Washington University School of Medicine. A feature of the banquet will be the twenty year reunion of the class of 1920, which on this occasion intends to present a gift to the medical school.

ILLINOIS

Outbreak of Influenza.—Because more than 100 students and several teachers were ill from influenza, the Drummer Township high school, Gibson City, was closed recently.

Typhoid Carriers at Manteno State Hospital.—Ninety-three typhoid carriers were discovered in a survey at the Manteno State Hospital recently, newspapers reported on February 9. The survey was made following an outbreak of typhoid at the hospital causing the death of fifty-three persons.

No Auto Deaths in Galesburg.—Galesburg, a city of 29,000 population, did not have a traffic fatality in 1939, newspapers report. In Knox County outside of Galesburg there were twelve deaths as a result of automobile accidents. Galesburg has been carrying on an intensive campaign against these accidents. The police have concentrated on enforcing traffic laws. Since schoolboy patrols went on duty this year at all the city schools, no pupil has been struck by a car.

Society News.—Dr. Willis C. Campbell, Memphis, Tenn., discussed "Internal Fixation of Fractures" before the Sangamon County Medical Society in Springfield, January 4.——At a meeting of the Logan County Medical Society on January 25, Drs. Ralph A. Reis and Harold J. Noyes, Chicago, discussed "Management of the Puerperium and Its Complications" and "Present Status of Dental Caries from the Standpoint of Knowledge of Etiology, Treatment and Dental Caries as an Index of Nutritional Adjustment" respectively.

Chicago

Clinical Meeting at Billings Hospital.—The clinical section of the Chicago Heart Association will meet at Billings Hospital, February 23. Dr. Arlie R. Barnes, Rochester, Minn., will be guest at the meeting. The following program has been arranged:

Drs. Dallas B. Phemister and Richard Sternheimer, Two Cases of Adhesive Pericarditis Treated Surgically.
Dr. Edith L. Potter, Embryological Background of Cardiac Malformations.
Dr. Andrew J. Brisden, The Clinical Measurement of Heart Size.
Dr. Wright R. Adams, Limitations of Objective Circulatory Measurements.
Dr. Louis Leiter, The Relation Between the Heart and Kidneys.
Dr. Barnes, Some Important Diagnostic Correlations of Electrocardiograms and Clinical Types of Heart Disease.

Medical Science and the Administration of Justice.—Dr. Alan R. Moritz, professor and head of the department of legal medicine, Harvard Medical School, Boston, will deliver the sixteenth Ludvig Hektoen lecture of the Frank Billings Foundation of the Institute of Medicine of Chicago, February 23, on "Medical Science and the Administration of Justice." On the same day there will be a medicolegal conference under the auspices of the institute's committee on local medicolegal problems with Dr. Oscar T. Schultz, Evanston, as chairman. The morning session will be held in the amphitheater of Cook County Morgue and will be given by the scientific staff of the county coroner's office. Albert J. Harno, dean of the college of law, University of Illinois, will preside at the afternoon session at the university's college of medicine. Speakers will include Capt. John I. Howe, Chicago Police Department; Dr. Israel Davidsohn; Fred E. Inbau, director of the Chicago Police Scientific Crime Detection Laboratory, and Benjamin C. Bachrach, public defender of Cook County. A tour will be made of the Chicago police laboratories, where there will be demonstrations of document examination, detection of deception by the lie detector, bombs and explosives, fingerprint examination and the study of blood stains, seminal stains and hair.

LOUISIANA

Graduate Medical Assembly—Dr. Matas Honored.—The fourth annual meeting of the New Orleans Graduate Medical Assembly will be held at the Roosevelt Hotel, February 26-29, in New Orleans. This year the assembly has been dedicated to Dr. Rudolph Matas, professor of general and clinical surgery, emeritus, Tulane University of Louisiana School of Medicine, New Orleans, in honor of his sixtieth year in active practice. The evening session of the first day will be in honor of Dr. Matas. Dr. Elliott C. Cutler, Boston, will speak on "Rudolph Matas—Dean of American Surgery" and Dr. Matas on "Along the Highways of Medicine in Louisiana." Included among the speakers on the scientific program will be:

Dr. William J. Dieckmann, Chicago, Types and Ambulatory Treatment of Patients with Toxemia of Pregnancy.
Dr. Henry L. Bockus, Philadelphia, The Clinical Status of Chronic Gastritis.
Dr. Eldridge L. Eliason, Philadelphia, Team Work in the Treatment of Biliary Disease.
Dr. Henry E. Michelson, Minneapolis, Treatment of Common Skin Diseases.
Dr. Shields Warren, Boston, Effects of Radiation on Tumors and Normal Tissues.
Dr. Guitman U. Newell, St. Louis, Radiation Therapy in Gynecology.
Dr. Francis M. Rackemann, Boston, The Pathology of Asthma.
Dr. James S. McLester, Birmingham, Ala., Role of the Vitamins in Human Nutrition.
Dr. David P. Barr, St. Louis, The Relationship of the Pituitary Gland to the Body as a Whole.
Dr. William F. Braasch, Rochester, Minn., Hypertension and the Surgical Kidney.
Dr. Donald S. Childs, Syracuse, N. Y., Radiology and the General Practitioner.
Dr. Arthur J. Bedell, Albany, N. Y., Medical Ophthalmoscopy.
Dr. Henry W. F. Woltman, Rochester, Minn., Neuritis.
Dr. Vilray P. Blair, St. Louis, Importance of Early Clinical Recognition of Cancer of the Face and Mouth.
Dr. William Mithoefer, Cincinnati, What the General Practitioner Should Know Concerning the Nasal Accessory Sinuses.
Dr. Marius N. Smith-Petersen, Boston, Arthroplasty of the Hip.
Dr. John A. Toomey, Cleveland, Chemotherapy in Acute Infectious and Contagious Diseases.
Dr. Fred M. Smith, Iowa City, Cardiac Therapy.

MICHIGAN

State Society Appointments.—At a meeting of the council of the Michigan State Medical Society in Detroit, January 13-14, Dr. Ray S. Morrish, Flint, was appointed councilor of the sixth district to fill the unexpired term of Dr. Irving W. Greene, Owosso, who resigned, and Dr. Otto O. Beck, Birmingham, councilor of the fifteenth district to fill the unexpired term of Dr. George A. Sherman, Pontiac, who resigned. Drs. L. Fernald Foster, Bay City, and William A. Hyland, Grand Rapids, were reelected secretary and treasurer, respectively.

Personal.—Dr. William J. O'Reilly, Saginaw, was honored at a banquet given by the Saginaw County Medical Society, January 30, in recognition of his completion of fifty years in the practice of medicine.——Dr. Charles E. Stewart, executive officer and president of the board of trustees of Battle Creek Sanitarium, was guest of honor at a banquet, January 17, marking his completion of fifty years in the practice of medicine.——Dr. Thomas R. K. Gruber, Eloise, was presented with an honorary membership in the Wayne County local number 25, American Federation of State, County and Municipal Employees, at a testimonial dinner, January 25. Glenn Coleman, president of the local, was toastmaster at the dinner.

MINNESOTA

University News.—Mrs. John Dwan has given $5,000 to the Minnesota Medical Foundation to support a program of the Human Serum Laboratory, which was established at the University of Minnesota Medical School, Minneapolis, in 1938. The laboratory is administered by a committee including Drs. Irvine McQuarrie, Paul F. Dwan and Erling S. Platou as a research and service project on the use of human serum for the prevention and treatment of certain infectious diseases.—— Dr. Albert V. Stoesser, associate professor of pediatrics, University of Minnesota Medical School, has received a grant-in-aid from the John and Mary R. Markle Foundation in support of his studies on water and electrolyte metabolism in intractable asthma.

Dr. Hilleboe Named to New Post of Medical Coordinator—Other Appointments.—Dr. Herman E. Hilleboe, St. Paul, head of the bureau of crippled children, division of social welfare, has been appointed medical coordinator for the state department of social security, according to the *Minneapolis Journal*. Dr. Malvin J. Nydahl, since 1937 director of hygiene and health education in Minneapolis public schools, succeeds Dr. Hilleboe in the work for crippled children. The position of medical coordinator was created by the reorganization act of 1939. The appointment marks the beginning of an expanded program to correlate the medical services under the department of social security. Dr. Hilleboe will directly supervise all purely medical functions and establish working agreements with other state departments in joint medical rehabilitation programs, it was stated. Medical consultation will be provided for various state institutions and special assistance tendered where needed throughout the department. An advisory committee was also announced composed of Drs. Alfred W. Adson, Rochester, chairman; Ludwig L. Sogge, Windom; Edwin J. Simons, Swanville; William A. Coventry, Duluth, and Chester A. Stewart, Minneapolis. Ex officio members are Drs. Albert J. Chesley, St. Paul, secretary of the state board of health; Mr. R. R. Rosell, St. Paul, executive secretary of the Minnesota State Medical Association, Dr. Hilleboe and Walter H. Finke, chairman of the social security board and director of the social welfare division. Special technical subcommittees of three members each will be named later to act as consultants in special fields, such as orthopedics, tuberculosis and dental care. Dr. Hilleboe was formerly director of the division of tuberculosis and services for crippled children under the old state board of control. Announcement was also made of the appointment of Dr. William Rademaker, Evansville, as head of the bureau for aid to county tuberculosis sanatoriums.

NEW JERSEY

Society News.—Drs. John W. Gray, Newark, and George H. Lathrope, Morristown, addressed a stated meeting of the Academy of Medicine of Northern New Jersey, Newark, February 15, on "The Internist's Attitude Toward Infection in the Teeth, Sinuses and Tonsils." Dr. John S. Lundy, Rochester, Minn., will address a meeting of physicians and dentists at the academy, February 27, on "Intravenous Anesthesia," with discussion by Dr. Henry S. Ruth, Merion Station, Pa. Dr. Henry M. Thomas Jr., Baltimore, addressed the section on medicine and pediatrics, February 13, on "Hypertension, Its Early Recognition and Management." —— Dr. Harold E. B. Pardee, New York, addressed the Essex County Medical Society, Newark, February 8, on "Treatment of Arteriosclerotic Heart Disease" and Drs. Charles E. North, New York, and Elmer G. Wherry, Newark, on "Milk Standards." —— Dr. William Wayne Babcock, Philadelphia, addressed the Bergen County Medical Society at Bergen Pines, February 13, on "Tumors of the Intestine."——Dr. Eugene P. Pendergrass, Philadelphia, addressed the Gloucester County Medical Society, Woodbury, January 18, on "The Role of the Radiologist in the Diagnosis of Intestinal Disease." Dr. Isidor S. Ravdin, Philadelphia, addressed the society, February 15, on "Biliary Tract Disease."

NEW MEXICO

Public Health Meeting.—Dr. Roscoe P. Kandle, Clovis, was chosen president-elect of the New Mexico Public Health Association at its recent annual meeting and Dr. John C. Mitchell, Silver City, was installed as president. Dr. Frank W. Parker Jr., Santa Fe, was elected secretary. Guest speakers included Drs. Ethel C. Dunham of the U. S. Children's Bureau, Washington, D. C., and Platt W. Covington of the Rockefeller Foundation, Salt Lake City, Utah.

NEW YORK

Society News.—Dr. Samuel W. Clausen, Rochester, addressed the Onondaga County Medical Society, Syracuse, February 6, on "Obstruction of the Alimentary Tract." —— Speakers at the winter meeting of the Madison County Medical Society in Oneida, January 18, were Drs. Sydney W. Stringer, on "The Vaginal Discharge"; Leon E. Sutton, "Early Local Care of Traumatic Wounds, with Special Reference to Wounds of the Face," and Earle E. J. Mack, "A Treatise on Vitamin Deficiencies." All are of Syracuse.——Dr. Plimpton Guptill, Rochester, addressed the Jefferson County Medical Society, Watertown, January 11, on diseases of the gallbladder.

New York City

Personal.—Dr. Morris L. Ogan, who recently retired after thirty-five years on the staff of the New York City Department of Health, was honored by his fellow workers at a dinner, January 6, at the Elks Club. Dr. Ogan was administrative assistant in the bureau of district health administration in charge of child and school health.

Friday Afternoon Lectures at the Academy.—The series of Friday afternoon lectures at the New York Academy of Medicine for the remainder of the season will be as follows:

Dr. Soma Weiss, Boston, Types of Syncope and Their Treatment, March 1.
Dr. Walter L. Niles, The Medical Treatment of Pain, March 8.
Dr. Byron P. Stookey, What Neurological Surgery Can Do for the Relief of Intractable Pain, March 15.
Dr. Arthur C. De Graff, An Evaluation of Some of the Newer Drugs, March 29.
Dr. William P. Thompson, An Evaluation of Newer Laboratory Methods, April 5.
Dr. Francis Carter Wood, A Critical Evaluation of the Diagnostic and Prognostic Tests for Cancer (The Bulkley Lecture), April 12.
Dr. Walter O. Klingman, Recent Advances in Treatment of Somatic Phenomena in Psychoneuroses, April 19.
Dr. Leo M. Davidoff, Recent Advances in the Diagnosis and Treatment of Diseases of the Central Nervous System, April 26.

Society News.—A symposium on recent advances in chemotherapy was presented before the Bronx County Medical Society January 17 by Drs. Reuben Ottenberg, who discussed streptococcic infection; Josephine B. Neal, meningitis; Cassius J. Van Slyke, gonorrhea, and Wheelan D. Sutliff, pneumonia. ——Dr. Herman J. Burman addressed the Bronx Otolaryngological Society January 23 on "Neck Infections."——William Cramer, Ph.D., addressed the Bronx Pathological Society January 16 on "The Etiology of Cancer."——Drs. Nathan B. Van Etten, President-Elect of the American Medical Association, and Terry M. Townsend, president of the Medical Society of the State of New York, addressed the Medical Society of the County of Queens January 30 on "The American Health Program" and "The Doctor Looks at the Citizen" respectively. Dr. Eli Jefferson Browder, Brooklyn, delivered a Friday afternoon lecture, February 2, on "The Use and Abuse of Dehydrating Agents in the Treatment of Head Injuries." —— Speakers at the annual meeting of the New York Heart Association, January 23, were Drs. John G. Gibson II, Boston, on "Some Observations on the Blood Volume in Heart Disease" and Charles Sidney Burwell, Boston, "Studies of the Circulation During Pregnancy."

NORTH CAROLINA

Annual Postgraduate Course.—The University of North Carolina School of Medicine and the extension division are sponsoring their third annual postgraduate course in medicine in Charlotte. The series of lectures is as follows:

Dr. Albert M. Snell, Rochester, Minn., Problems Presented by the Symptom Jaundice, February 6.
Dr. Tom D. Spies, Cincinnati, Diagnosis and Treatment of Vitamin Deficiencies in Man, February 13.
Dr. Walter E. Dandy, Baltimore, Ménière's Disease and Other Vertigoes: Cranial Neuralgias and Other Diseases and Lesions of the Cranial Nerves, February 20.
Dr. Udo J. Wile, Ann Arbor, Mich., Diagnosis and Treatment of Syphilis, March 5.
Dr. James H. Means, Boston, Thyroid and Other Endocrine Disorders, March 12.
Dr. Emil Novak, Baltimore, Management of the Menopause, March 19.

OREGON

Changes in Health Officers.—Dr. David R. Rich, La Grande, has been appointed health officer of Union County, it is reported.——Dr. Lenor S. Goerke, McMinnville, has resigned as health officer of Yamhill County to go to Yolo County, Calif.; Dr. Hallister M. Stolte, Portland, is acting head of the department, newspapers report.

Personal.—Dr. Joseph B. Bilderback, Portland, was honored at a gridiron dinner given by about 300 friends at the University Club in Portland, January 5, in recognition of his recent election to the presidency of the American Academy of Pediatrics. Dr. Ralph A. Fenton, on behalf of the group, gave Dr. Bilderback a silver bowl.

PENNSYLVANIA

Special Meeting of Delegates.—A special meeting of the house of delegates of the Medical Society of the State of Pennsylvania will be held in Harrisburg, February 28, for consideration of a report on the proposed plan for the Medical Service Association of Pennsylvania.

Society News.—Drs. Dickinson Sergeant Pepper, Philadelphia, and Dale C. Stahle, of the state department of health, Harrisburg, addressed the Dauphin County Medical Society, Harrisburg, February 6, on "Treatment of Pneumonia" and "Pneumonia Problems in Pennsylvania" respectively.——Dr. Joseph C. Yaskin, Philadelphia, will address the Harrisburg Academy of Medicine, February 20, on "The Commoner Neuritides and Neuralgias, Their Diagnosis and Treatment."

Philadelphia

University Class Reunion.—The class of 1911 of the University of Pennsylvania School of Medicine will hold its thirtieth reunion this year instead of in 1941 in order to participate in the bicentennial celebration of the university to be held in September. The class will have a luncheon and dinner, September 19, at the Pine Valley Country Club, Clementon, N. J. Dr. Wilbur H. Haines, Philadelphia, is secretary.

Symposium on Allergy.—The Philadelphia County Medical Society held a meeting on allergy, February 14, with the following speakers: Drs. James Alexander Clarke Jr., on "Early Diagnosis of Asthma"; Austin T. Smith, "Management of the Nose and Paranasal Sinuses in Asthma," and Francis M. Rackemann, "Theory and Mechanism of Allergy." Dr. Richard A. Kern was the commentator.

Personal.—Mr. William H. Donner, founder of the International Cancer Research Foundation, received the honorary degree of doctor of laws from the University of Pennsylvania at the midyear convocation.——Dr. Milton Fraser Percival was recently elected president of the Medical Club of Philadelphia and Dr. Edward B. Krumbhaar of the College of Physicians of Philadelphia.

RHODE ISLAND

Society News.—Lester A. Round, Ph.D., state director of health, and members of his staff addressed a special midwinter meeting of the Rhode Island Medical Society in Providence, January 24, on "The State Department of Health, Its Organization and Functions."——Dr. Louis K. Diamond, Boston, addressed the Providence Medical Association, February 5, on "Treatment of Anemias in Infancy and Childhood with Special Reference to Splenectomy."——Dr. Milton C. Winternitz, New Haven, Conn., addressed a meeting of the Rhode Island Society of Neurology and Psychiatry, February 12, at the State Hospital for Mental Diseases, Howard, on "The Pathology of Arteriosclerosis."

TENNESSEE

Division of Tuberculosis in State Health Department.—A separate division of tuberculosis has been set up in the state department of health, it is reported. Dr. Roydon S. Gass, Franklin, who has been in charge of the field diagnostic service for tuberculosis for several years, will be in charge of the division, which was authorized by the 1939 legislature. The program of the new unit will consist of study and research, case finding and hospitalization. A new hospitalization service was recently instituted by the department (THE JOURNAL, Sept. 16, 1939, p. 1140).

Society News.—Dr. Edward L. Turner, Nashville, addressed the Nashville Academy of Medicine and Davidson County Medical Society, Nashville, January 9, on "Some Clinical Manifestations Resulting from Endamoeba Histolytica Infections."——Dr. William E. Chamberlain, Philadelphia, addressed the Chattanooga and Hamilton County Medical Society, January 18, on "Pitfalls in X-Ray Diagnosis."——Drs. James W. Bodley and Emmett R. Hall, Memphis, addressed the Madison County Medical Society, Jackson, January 2, on infections of the hand and arm, and the more common dermatoses, respectively.

Internships Available.—Announcement is made of two internships in pathology at the John Gaston Hospital, the teaching hospital of the University of Tennessee College of Medicine, Memphis. The term of service is for one year dating from July 1. Lodging, board, uniforms, laundry and $20 a month are offered. After the internship one of the two men would be eligible for a two year appointment as assistant resident pathologist at the hospital and assistant in pathology in the medical school for the term July 1, 1941, to July 1, 1942. The hospital will furnish lodging, board, uniforms and laundry and the university a salary of $32.50 a month. Following that period an appointment as resident pathologist will be available for the period July 1, 1942, to July 1, 1943. Lodging, board, uniforms and laundry will be furnished by the hospital and a salary of $65 a month by the university. Investigative work will be encouraged, according to the announcement. The John Gaston Hospital is a general hospital of 550 beds, with annual admissions of 15,976 to the hospital and 155,758 visits to the outpatient department. Applicants are requested to submit full information, including name in full, place of birth, present address, age, sex, nationality, religion, whether he is single or married, academic training, date of finishing present appointment, date on which service could begin, two recommendations and a photograph. Dr. Harry C. Schmeisser is chief of the division of laboratories at the hospital.

UTAH

Resolutions Concerning Licensure.—The Utah State Examining Committee of Physicians and Surgeons of the Department of Registration at a meeting, January 17, adopted a resolution requiring candidates for licenses who have had the major portion of their education in foreign schools to furnish satisfactory evidence of moral and educational qualifications and to pass the state board examinations. The committee also approved a resolution requiring all applicants to be graduates of medical schools approved by the department of registration. Finally the committee recommended to the director of the department of registration that applicants for reciprocal licenses be required to prove that equal privileges are granted by the state or country from which they come. It was pointed out that certain states and foreign countries grant reciprocal licenses only after a physician has practiced a certain number of years. The Utah director was therefore urged not to grant licenses on more favorable terms than those on which such a license would be granted in the state or country in which the applicant is domiciled.

VIRGINIA

McGuire Lectures and Spring Clinic.—The annual Stuart McGuire Lectures of the Medical College of Virginia will be delivered, April 16-17, by Dr. C. Frederic Fluhmann, San Francisco. Dr. Fluhmann's subjects will be "Anesthesia and Analgesia in Obstetrics" and "The Problem of Abnormal Uterine Bleeding." The annual spring postgraduate clinics will be held, April 17, on the general subject "Toxemias of Pregnancy." The speakers will be Drs. Nicholson J. Eastman and Louis H. Douglass, Baltimore; Tiffany J. Williams, Charlottesville, and Francis Bayard Carter, Durham, N. C.

WASHINGTON

Society News.—A symposium on diseases of the kidney was presented before the King County Medical Society, Seattle, January 22, by Drs. Frank J. Clancy, Alexander B. Hepler, Alexander H. Peacock and Ole A. Nelson. A symposium on biliary disease was presented on February 5 by Drs. Fred J. Jarvis, Carl S. Leede and William C. Speidel.——Dr. Frank Perlman, Portland, Ore., addressed the Whitman County Medical Society, February 1, on "Phases of Allergy of Interest to the General Practitioner."

WYOMING

Personal.—Dr. Eugene G. Ewing has resigned as health officer of Albany County and Dr. Lee W. Storey, Laramie, has been appointed his successor.——Dr. Thomas B. Croft, Lovell, was elected president of the Northwest Wyoming Medical Society at a recent meeting in Lovell.

PUERTO RICO

University News.—Dr. Frederick J. Brady, of the U. S. Public Health Service, has been detailed to the School of Tropical Medicine conducted at the University of Puerto Rico, San Juan, under the auspices of Columbia University to conduct research in parasitology for six months.——Dr. Guillermo Ruiz Cestero, San Juan, gave a seminar lecture at the School of Tropical Medicine, January 18, on "Fluorography: A New Method of Obtaining Films of the Chest at a Very Low Cost." Dr. Manuel A. Astor, Arecibo, was the speaker, January 11, on "Fractures of the Elbow."——At the annual meeting of the Puerto Rico Medical Association in December the house of delegates approved a resolution expressing its satisfaction and pride in the work of the School of Tropical Medicine and offered support for future undertakings.

GENERAL

Tuberculosis Fellowships Adjourned.—The *Bulletin* of the National Tuberculosis Association announces that the secretariat of the International Union Against Tuberculosis, in agreement with the National Italian Federation Against Tuberculosis, has decided to adjourn competition for six fellowships at the Carlo Forlanini Institute because of European conditions. Fourteen applications had been received from twelve countries, including the United States.

Red Cross Meeting Plans Changed.—The time and place of the annual meeting of the American Red Cross, which was to be held in Atlanta, Ga., May 13-16, have been changed to Washington, D. C., May 6-8. According to a statement by the national chairman, Norman H. Davis, the exceptional pressure occasioned by the European situation has placed such an added burden on the national officers that absence from Washington for four or five days is unwise.

Rheumatism Congress Postponed.—The American Committee of the Ligue internationale contre le rhumatisme and the American Rheumatism Association announce that the seventh International Congress on Rheumatic Diseases, which was to have been held June 8-10 in Philadelphia, Boston and New York, has been postponed "until the European horizon widens." Dr. Ralph Pemberton, Philadelphia, is president of the international league and Dr. Philip S. Hench, Rochester, Minn., of the American Rheumatism Association. Dr. Loring T. Swaim, Boston, is secretary of the American association.

Dr. Gudakunst Medical Director of Infantile Paralysis Foundation.—Dr. Don W. Gudakunst, U. S. Public Health Service, has been appointed medical director of the National Foundation for Infantile Paralysis, effective February 1. He will have his office at the foundation's headquarters at 120 Broadway, New York. Dr. Gudakunst graduated at the University of Michigan Medical School, Ann Arbor, in 1919. He served for many years with the Detroit Department of Health and later as commissioner of health of Michigan. He was also professor of preventive medicine and public health at Wayne University College of Medicine, Detroit.

Goiter Prize Competition.—The American Association for the Study of Goiter again offers the Van Meter Prize Award of $300 and two honorable mentions for the best essays concerning original work on problems related to the thyroid gland. The essays may cover clinical or research investigations, should not exceed 3,000 words, and must be presented in English. A typewritten double spaced copy must be sent not later than March 15 to the corresponding secretary of the association, Dr. William Blair Mosser, 133 Biddle Street, Kane, Pa. A place will be reserved on the program of the annual meeting for presentation of the prize award essay by the author if it is possible for him to attend. The essay will be published in the annual proceedings of the association, but this will not prevent its further publication in any journal selected by the author. The next meeting of the association will be in Rochester, Minn., April 15-17. The winner of the 1939 competition was Dr. Theodore L. Althausen, associate professor of medicine, University of California Medical School, San Francisco.

Orthopsychiatric Meeting.—The seventeenth annual meeting of the American Orthopsychiatric Association will be held on February 22-24 at the Hotel Statler, Boston. Among the papers to be presented are the following:

Dr. William Healy, Boston, Psychiatry and the Treatment of Youthful Offenders in the Plans of the Committee of the American Law Institute.
Dr. Joseph J. Michaels, Boston, Parallels Between Persistent Enuresis and Delinquency.
Dr. Joseph Lander, Hawthorne, N. Y., A Study of Traumatic Emotional Factors in the Backgrounds of 116 Delinquent Boys.
Dr. Everett S. Rademacher, New Haven, Conn., Democracy and Mental Hygiene in the Home.
Dr. Lawson G. Lowrey, New York, Personality Distortion and Early Institutional Care.
Dr. Fred Temple Burling, Ridgewood, N. J., The Role of the Professionally Trained Hygienist.
Dr. Charles Bradley and Margaret Bowen, R.N., East Providence, R. I., Amphetamine (Benzedrine) Therapy of Children's Behavior Disorders.

Annual Report of Commonwealth Fund.—Completing its twenty-first year, the Commonwealth Fund in its annual report recalls that its work was begun with gifts for war service and relief and that part of its income was devoted to relief and reconstruction for more than ten years. Now all its major objectives are threatened by war; many of its activities have been disrupted for the time being. Gradually changing its emphasis to American health, the Fund has since 1918 appropriated for its main interests more than $13,500,000 to the promotion of physical health; nearly $7,000,000 for mental health, and for fellowships to bring British graduate students to American universities, $3,250,000. Appropriations for the year ended Sept. 30, 1939, amounted to $1,919,908.73, of which about two thirds was for the promotion of health through medical education, medical research, public health and the rural hospital program. To aid in the development of public health activities in Oklahoma, Alabama, Tennessee, Mississippi and Massachusetts, the Fund appropriated $356,619.72. This appropriation also covered fellowships for physicians and nurses to study at Harvard, Tulane and Vanderbilt universities and at Tufts College. The rural hospital program sponsored by the Fund now includes ten hospitals completed, two in the planning or construction stage and one not built by the Fund but receiving cooperation. The appropriation for this division, $491,606.67, includes not only construction but fellowships for physicians and hospital personnel, support of a training course for hospital administrators at the University of Chicago and technical advisory service. Two of the older hospitals in this group are now so overloaded that plans are being made to enlarge them. Mental hygiene, a major preoccupation of this foundation from the beginning, claimed an appropriation of $193,329. The Fund's method in this field at present is to encourage the interpretation of psychiatry and clinical medicine, primarily in the practice of pediatrics, through fellowships for graduate training and through establishment of clinical teaching facilities which bring a psychiatric point of view into the pediatric service. The Fund supports the development of psychiatry at the University of Louisville and the work of the division on community clinics of the National Committee for Mental Hygiene; a teaching clinic and psychiatric unit for children at the University of Minnesota; a new similar unit at Stanford University School of Medicine, and fellowships at various universities and hospitals. One of the casualties of the war is in this field. The London Child Guidance Clinic and Training Center, supported by the Fund, has closed for the duration of the war; the Child Guidance Council has moved its headquarters to Bath and taken up emergency duties in addition to its usual program. Fellowships granted to British students to study in the United States have also been interrupted in many cases and four American students who planned to study abroad have had to postpone the trip or transfer their work elsewhere. Few new grants for medical research were made, the report stated, the greater part of the funds available for this purpose having been pledged previously. The new ones included funds for two ultracentrifuges at Harvard University for the study of protein chemistry; studies of kidney function, chemical factors in resistance to disease and leukemia.

Foreign Letters

LONDON

(From Our Regular Correspondent)

Jan. 13, 1940.

Food Rationing Begun

In this war, as in the last, the allies hold command of the sea. The submarine campaign has failed and the losses of ships from the strewing of the sea with mines are too small to affect commerce seriously. This ruthless procedure has caused more losses to neutrals than to the allied powers. Britain imports a large part of the food supply and there is plenty of shipping to bring it. But the war is a strain on the national resources. The importation of munitions on a large scale and the movement of troops limit the shipping which can be used for food. Moreover, millions of fighting men withdrawn from production have to be fed. It is not surprising that rationing of food has been introduced. The object is that all, rich or poor, shall be able to obtain sufficient food. There is plenty of food in the country, but some control is necessary in the case of a few favorite foods. Their rationing is only a small inconvenience, as there are plenty of alternatives. Only butter, bacon, ham and sugar have been rationed, but in February meat will be added to the list.

The weekly allowance of butter is only 4 ounces to a person, about half the normal consumption. But this is not important nutritionally, as all other fats are unrestricted and there is an excellent margarine, indistinguishable from butter and containing vitamins. The weekly allowance of bacon or ham is also 4 ounces. This again is unimportant, as there are so many alternatives. The allowance of sugar is 12 ounces a week. Syrup, treacle, jam and confections are not rationed. Meat will be rationed not by quantity but by price, the weekly allowance being 36 cents. This restriction does not affect nutrition, as there are many unrationed sources of protein—fish, poultry, game, milk and cheese. Moreover, the edible offals—liver, kidney, sweetbreads—are unrationed. A main cause for this mild rationing is that the government has decided that the fighting services must be better fed than civilians are in time of peace.

The Pelvic Osteo-Arthropathy of Pregnancy

Loosening of the pelvic joints in pregnancy to facilitate labor is an observation which goes back to Hippocrates, but it has generally been regarded as only physiologic, though Joel E. Goldthwait (THE JOURNAL, Aug. 31, 1907, p. 768) and others drew attention to the frequent part played by softening of the sacro-iliac joints in the production of the backache of pregnancy. To the Section of Obstetrics and Gynecology of the Royal Society of Medicine, Prof. James Young made a communication based on forty-two cases of pelvic osteo-arthropathy in pregnancy, of which thirty-four occurred in a series of 4,512 pregnant women (0.75 per cent). The symptoms were pain and tenderness in the sacro-iliac and pubic regions coming on during pregnancy and aggravated by walking, which was often difficult and in seven cases impossible. There was frequently a limp or waddle in the gait. In some cases the pain and tenderness were located in one sacro-iliac joint. In cases of severe locomotor difficulty there were often pain and tenderness along the line of the adductor muscles of the thigh. A number of patients dated the symptoms from some trauma, which might be trivial, such as a slip or a fall. In one case bending down to tie a shoe lace was immediately followed by acute symptoms. In thirty-three cases the time of onset of the symptoms was recorded. In thirty-two they arose during pregnancy and in one ten days after delivery, when the patient got out of bed. The average time of onset was the twenty-sixth week of pregnancy, the earliest the eighth week and the latest the thirty-sixth. Thirteen of the patients were primiparas.

Professor Young could not find that the symptoms bore any relation to the increase of pubic separation, as other workers have suggested. Many cases with severe symptoms showed no greater widening than is found ordinarily in pregnancy without symptoms. But when pubic symptoms were severe a gliding movement could easily be detected at the joint when grasped between a finger in the vagina and the thumb over the symphysis, and the patient was asked first to stand on one foot and then on the other.

Why does a condition which must be regarded as essentially physiologic sometimes pass over into the pathologic? In five of the thirty-four cases there was a definite relation to a minor accident. Lowered tone of the muscles supporting the joints may in some cases render them liable to damage. It may be significant that fifteen of the thirty-four women suffered from associated conditions such as toxemia and pyelitis. The alteration of the spinal curves consequent on the passing forward of the center of gravity of the body because of the enlarging uterus transmits the body weight along new lines and may create stresses in the pelvic joints and muscles. Finally, an endocrine origin is given for the softening of the pelvic joints.

The treatment in mild cases is the provision of a strong abdominopelvic belt and restricted exercise. In more severe cases rest in bed for from one to three weeks may give so much relief as to make walking comfortable with the support of the belt. In the worst cases complete rest in bed till delivery is necessary. In such the hammock, as used for the treatment of fractured pelvis, is of great value. These women cannot tolerate the gentlest movement in bed, as in placing the bedpan. After delivery the treatment varies with the case. In mild cases the symptoms disappear in the ordinary lying-in period. In severer cases rest in bed for two or three weeks may be required, followed by a supporting belt for several months. In the worst cases the hammock should be continued for at least a month and possibly for several months.

OSLO

(From a Special Correspondent)

Jan. 3, 1940.

The Problem of Induced Abortions

In the lay as well as in the medical press during the last few years, the discussion of the ethics of induced abortions seems to have been fruitless. At any rate no concrete measure for the reform of existing legislation has emerged. And the fanatics at both extremes have been most successful in exasperating the man in the street as well as each other. A study of the problem was presented last autumn to the Norwegian Medical Society by Dr. Johan Haffner, who is attached to Akers Hospital, Oslo. Part of it concerns facts, part proposals.

In the Akers Hospital in the seven year period 1932-1938, 970 cases of abortion were dealt with. Seventy-nine per cent of the women were married, and more than three fourths of these married women had already given birth to one child or more. Only in 3.2 per cent of the total was the age of the patient under 20, all of which data go to invalidate the popular fallacy that the criminal induction of abortion is mainly the concern of irresponsible, juvenile, unmarried women. Sixty per cent of these abortions were afebrile. There were fifteen deaths, an average of two a year. Dr. Haffner calculated that in the public hospitals alone some seven or eight women die every year in Oslo of abortion. In as many as eighty-three of the 131 cases in which the induction of abortion was confessed to, a catheter had been employed, usually by the woman herself,

Dr. Haffner would stop the trouble at its source, i. e. by the teaching of birth control by competent persons. He suggests that, before discharge from hospital, every patient who has been treated for abortion should be given instructions as to how to prevent pregnancy in the future. The pornographic and usurious conditions under which catheters and allied devices are hawked round to the public should be stamped out by the authorities, who should themselves provide the advice and other help needed by so many women in these circumstances. It is gratifying to note that prosecutions have already been instituted against the worst offenders in this field.

At a recent meeting in Oslo of the Norwegian Medical Society, a resolution was adopted to the effect that this society sees in the illegal interruption of pregnancy a medical problem which is serious. The resolution proceeds: "As a contribution to the campaign against this evil, the society recommends that the number of health centers for maternity and child welfare be increased and their activities extended to the teaching of the physiology of sex and of contraception so that this too comes under medical control. The society also finds that both humane and medical considerations indicate an extension of legal opportunities for interrupting pregnancy when there are cogent arguments for doing so." This resolution is the more important as the Norwegian Medical Society is fairly representative of the whole of the Norwegian medical profession, although less than half of the doctors in Norway are members of this society.

ITALY

(From Our Regular Correspondent)

Dec. 30, 1939.

A New Law Affecting Servants

A law was recently made by which persons suffering from infections of a contagious nature are not allowed to enter the domestic service. All servants must pass medical examinations, which are free of charge and which will be repeated at specified intervals. The results of the examinations will be kept in special records. The penalty for infraction of the law, both patrons and servants, is a fine up to 500 lire ($25).

Lecture on Venereal Lymphogranuloma

Prof. A. Midana, of Turin, in a lecture before the Società di gastro-enterologia of that city, discussed venereal lymphogranuloma. All varieties of the anorectocolonic form, which is the most frequent, should be grouped under the name of infiltrating rectitis. Often the rectal lesions progress to the lower segments of the large intestine. It is possible that certain forms of colonic diseases which are diagnosed as ulcerous colitis are forms of inguinal lymphogranuloma with extension to the colon. The formation of fistulas is a grave complication. The pathogenesis of the condition is unknown. The various theories agree that inoculation of the rectal walls takes place either directly through the mucosa or through the neighboring lymphatic regions. The development of either the hypertrophic or the stenotic form of the disease depends on the mechanism by which contagion takes place, which in turn depends on the sex of the patient.

Test for Liver and Renal Functions

Prof. E. Macchia, of Naples University, in a lecture before the Accademia medica of Naples, reported a simple technic for determination of indole in the blood as a test for liver and renal functions. An intravenous injection of a 2 per thousand indole solution is slowly administered to patients during fasting. The solution is prepared in physiologic solution of sodium chloride. The dose is 1 cc. of the solution for each 6 Kg. of body weight. Blood for determining indole is taken ten minutes after the injection and again 120 minutes after it. The first blood is withdrawn for diagnosis of the detoxicating functions of the liver, the second one for diagnosis of the emunctory functions of the kidneys. The amount of indole in the blood serum of the first sample of blood varies between 0.15 and 0.2 mg. for each thousand cubic centimeters of blood if the detoxicating functions of the liver are normal. The figures are higher if the functions of the liver are poor. The amount of indican in the blood of the second sample varies between 1.4 and 1.5 mg. for each thousand cubic centimeters of blood if the emunctory functions of the kidney are good. The more acute the emunctory dysfunctions of the kidney, the higher the figures of indicanemia. The test is reliable. The amount of indole in the blood of patients who are suffering from renal diseases or uricacidemia is normal after indole loading, whereas it is increased in patients with liver detoxicating dysfunction.

Treatment of Malaria

Professor Pansini reported to the Accademia della scienze mediche e chirurgiche, of Naples, the results of different treatments in more than 3,000 cases of benign malaria in Italians coming home from Africa. The different treatments used in various groups of patients were epinephrine, atabrine, quinine and antimony tartrate. He concluded that the evolution of malaria can be favorably modified by any of the various treatments which are commonly employed.

No treatment, either alone or in association with another, controls malaria unless a certain time elapses and immunity develops. Radical changes in the environment and living habits of the patients, such as change of climate, rest and adequate food, are important factors in accelerating the establishment of immunity in malaria. Quinine has specific action in controlling the attack but does not prevent malarial recurrences. When the drug is administered over a long period, reappearance of malaria is prevented. However, attacks frequently reappear after discontinuation of the drug. The speaker believes that quinine has a specific biologic action by which the pyretogenic properties of plasmodia are neutralized. Atabrine prevents recurrences for longer periods than those induced by quinine. Epinephrine neither prevents nor prolongs the intervals between attacks. Sometimes the attacks take place more often during epinephrine treatment than before it. The effects of epinephrine are better when it is administered in association with other drugs than when given alone. The results of the antimony and potassium tartrate treatment are inconstant. The alternate administration of some drugs of antimalarial value gives satisfactory results.

Marriages

Myers Bowman Deems, Huntington, Ind., to Miss Florence Esther Woods, of Evansville, in Orlando, Fla., Dec. 28, 1939.

Joseph James Sofranec Jr., Youngstown, Ohio, to Miss Jean Louise Lumpp, of Sharon, Pa., in New Orleans, January 6.

Julian Kenneth Welch Jr., Memphis, Tenn., to Miss Eva Lucille Mount, of Trezevant, Tenn., Dec. 17, 1939.

Robert Lee Robinson, Mars Hill, N. C., to Miss Sara Helen Willingham, of Atlanta, Ga., in December 1939.

Kent A. Dewey, Grand Rapids, Mich., to Miss Margaret McGregor, of Lynnville, Tenn., Dec. 24, 1939.

Charles Barrett Kennedy to Dr. Rebecca Studwick Wright, both of New Orleans, Dec. 20, 1939.

Oscar Edgeworth Bloch Jr. to Miss Jean Russell, both of Louisville, Ky., in December 1939.

Leland H. Dame to Miss Mary Lee Price, both of West Palm Beach, Fla., Dec. 25, 1939.

George R. O'Daniel to Miss Esther Cordell, both of Hartsville, S. C., Dec. 20, 1939.

Joseph M. Ruda to Miss Florence Rudzinski, both of Chicago, Nov. 23, 1939.

S. Charles Freed to Miss Shirley Kolinsky, both of Chicago, February 11.

Deaths

Frank Hicks Walke ● Shreveport, La.; Baltimore Medical College, 1912; formerly secretary of the Shreveport Caddo Parish Medical Society; for many years secretary-treasurer of the Tri-State Medical Association (Texas, Arkansas, Louisiana); member of the parish school board; held a commission in the U. S. Navy and was a member of the medical advisory board during the World War; at one time parish health officer; was physician in chief to the Home for the Aged; for many years federal jail physician; member of the staffs of the Highland Sanitarium, Schumpert Memorial Sanitarium and the Pines Sanatorium; member of the board of trustees of Dodd College; aged 53; died, Dec. 21, 1939.

John Francis Condon ● Newark, N. J.; Long Island College Hospital, Brooklyn, 1901; past president of the Essex County Medical Society; member of the state board of medical examiners; fellow of the American College of Surgeons; attending gynecologist to the Essex County Isolation Hospital, Belleville; chief, department of obstetrics and gynecology and medical director, St. James Hospital; attending obstetrician to the Newark City Hospital, consulting obstetrician to the Irvington (N. J.) General Hospital, Hospital of St. Barnabas and for Women and Children, Presbyterian Hospital, Newark and St. Mary's Hospital, Orange; aged 67; died, Dec. 8, 1939, of coronary thrombosis.

Carl Richard Keppler, Newark, N. J.; Columbia University College of Physicians and Surgeons, New York, 1898; member of the Medical Society of New Jersey; formerly professor of orthopedics at the Fordham University School of Medicine, New York; served at various times and in different capacities on the staffs of the Yorkville Hospital, Harlem Hospital, Sydenham Hospital and the Fordham Hospital, New York; St. Elizabeth's Hospital, Elizabeth, and Somerset Hospital, Somerville; aged 62; died, Dec. 27, 1939, of cerebral hemorrhage.

Alfred Bielschowsky ● Hanover, N. H.; Universität Leipzig Medizinische Fakultät, Saxony, Germany, 1894; professor of ophthalmology at Dartmouth Medical School; formerly professor of ophthalmology at the University of Breslau, Germany, and member of the faculties of the Universities of Marburg and Leipzig; member of the New England Ophthalmological Society; director of the Dartmouth Eye Institute; aged 68; died, January 6, at the Jewish Hospital, Brooklyn, following an operation for brain tumor.

Seneca Egbert ● Wayne, Pa.; University of Pennsylvania Department of Medicine, Philadelphia, 1888; emeritus professor since 1932 and professor of hygiene from 1916 to 1931 at his alma mater; professor of hygiene from 1893 to 1916 and dean from 1898 to 1916, Medico-Chirurgical College of Philadelphia; professor of hygiene, Temple University School of Medicine, Philadelphia, from 1896 to 1899; author of "A Manual of Hygiene and Sanitation" published in eight editions and "Personal Hygiene for Nurses"; aged 76; died, Dec. 6, 1939.

Le Roi Goddard Crandon ● Boston; Harvard Medical School, Boston, 1898; fellow of the American College of Surgeons; instructor of surgery at his alma mater from 1903 to 1918; on the staffs of the Whidden Memorial Hospital, Everett, Chelsea (Mass.) Memorial Hospital and the Home Memorial Hospital, New London, Conn.; author of "Surgical After-Treatment" published in 1911; aged 66; died, Dec. 27, 1939.

James Douglas Crane ● Ishpeming, Mich.; College of Physicians and Surgeons, Baltimore, 1914; past president of the Marquette-Alger Counties Medical Society; fellow of the American College of Surgeons; served during the World War; on the staff of the Ishpeming Hospital; aged 47; died, Dec. 18, 1939, in the Columbia Hospital, Milwaukee, of coronary disease and chronic hypertension.

Roy Ernest Mitchell ● Eau Claire, Wis.; University of Minnesota College of Homeopathic Medicine and Surgery, Minneapolis, 1901; member of the American Psychiatric Association; past president and secretary of the Eau Claire and Associated Counties Medical Society; on the staff of the Luther Hospital; aged 63; died, Dec. 12, 1939, of coronary occlusion.

Ernest Mitchell Fuqua, Pulaski, Tenn.; Vanderbilt University School of Medicine, Nashville, 1911; member of the Tennessee State Medical Association; served during the World War; at one time superintendent of the Protestant Hospital, Nashville; member of the state board of health; aged 58; died, Dec. 31, 1939, in St. Thomas Hospital, Nashville.

Kenneth Cameron, Westmount, Que., Canada; McGill University Faculty of Medicine, Montreal, 1887; fellow of the American College of Surgeons; served during the World War; formerly lecturer in clinical surgery at his alma mater; on the staff of the Montreal General Hospital for many years; aged 76; died, Dec. 25, 1939, of heart disease.

George McClellan Liston ● Baldwin City, Kan.; Medical College of Indiana, Indianapolis, 1892; Hospital College of Medicine, Louisville, Ky., 1896; past president of the Douglas County Medical Society; aged 75; died, Dec. 18, 1939, in the University of Kansas Hospital, Kansas City, of prostatic hypertrophy and heart disease.

Edson Elisha Gadd ● Des Moines, Iowa; Eclectic Medical Institute, Cincinnati, 1897; Bennett College of Eclectic Medicine and Surgery, Chicago, 1903; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1905; aged 70; died, Dec. 9, 1939, of coronary thrombosis.

Francois Louis Demers, Montreal, Que., Canada; School of Medicine and Surgery of Montreal, Faculty of Medicine of the University of Laval at Montreal, 1909; formerly member of the city council and member of the medical staff of the city health department; served during the World War; aged 57; died, Dec. 26, 1939.

Todd Caris, Mount Gilead, Ohio; Starling Medical College, Columbus, 1895; member of the Ohio State Medical Association; for many years county coroner; secretary of the Morrow County Medical Society; served during the World War; aged 68; died, Dec. 28, 1939, in the Marion (Ohio) City Hospital of myocarditis.

Arthur Henry Domann ● Orange, Calif.; College of Physicians and Surgeons, medical department of the University of Southern California, Los Angeles, 1911; fellow of the American College of Surgeons; on the staffs of the Orange County Hospital and St. Joseph Hospital; aged 60; died, Dec. 11, 1939.

Thomas Vincent McLaughlin, Wilkes-Barre, Pa.; Medico-Chirurgical College of Philadelphia, 1906; member of the Medical Society of the State of Pennsylvania; served during the World War; aged 60; for many years on the staff of the Mercy Hospital, where he died, Dec. 10, 1939.

William Rado ● Newark, N. J.; Magyar Királyi Pazmány Petrus Tudományegyetem Orvosi Fakultasa, Budapest, Hungary, 1918; member of the National Gastrological Association; aged 46; died, Dec. 30, 1939, in the Beth Israel Hospital of gangrenous appendicitis.

Robert Ferguson, West Hartford, Conn.; Yale University School of Medicine, New Haven, 1903; fellow of the American College of Surgeons; formerly on the staff of the Copper Queen Hospital, Bisbee, Ariz.; aged 64; died, Dec. 12, 1939, of coronary embolism.

George E. Kerr ● Chattanooga, Okla.; Detroit College of Medicine, 1894; past president of the Comanche County Medical Society; aged 72; died, Dec. 25, 1939, in the Wichita General Hospital, Wichita Falls, Texas, of heart disease and bronchopneumonia.

James Thomas Breedlove, St. Louis; Meharry Medical College, Nashville, Tenn., 1912; aged 61; on the staffs of St. Mary's Infirmary, Homer G. Phillips Hospital and the Peoples Hospital, where he died, Dec. 31, 1939, of pneumonia and ruptured appendix.

Frank Laird Kennedy, Camden, N. J.; Hahnemann Medical College and Hospital of Philadelphia, 1928; for many years on the staff of the West Jersey Homeopathic Hospital; aged 35; died, Dec. 3, 1939, in the Hahnemann Hospital of typhoid.

John Krupp Hedrick, Telford, Pa.; Hahnemann Medical College and Hospital of Philadelphia, 1898; for many years president of the board of health, and secretary of the board of education; aged 69; died, Dec. 12, 1939, of cerebral hemorrhage.

James Madison Hamilton, Los Angeles; University of Vermont College of Medicine, Burlington, 1893; member of the Vermont State Medical Society; served during the Spanish-American and World wars; aged 71; died, Dec. 10, 1939.

Mathew Earl O'Keefe ● Council Bluffs, Iowa; John A. Creighton Medical College, Omaha, 1906; fellow of the American College of Surgeons; on the staff of the Mercy Hospital; aged 58; died, Dec. 6, 1939, of coronary thrombosis.

Don Rhodolph Flower, Park Falls, Wis.; Bennett College of Eclectic Medicine and Surgery, Chicago, 1894; for many years member of the Park Falls city council, and health officer; aged 88; died, Nov. 14, 1939, of senility.

Clarence Henderson, Lind, Wash.; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1906; for many years member of the school board, and health officer; aged 70; died, Dec. 1, 1939.

Alice Rogers Easby, Media, Pa.; Woman's Medical College of Pennsylvania, Philadelphia, 1884; member of the Medical Society of the State of Pennsylvania; aged 79; died, Dec. 29, 1939, of arteriosclerosis and heart disease.

Thomas Fulton McConaghie, Oakdale, Ill.; St. Louis University School of Medicine, 1904; member of the Illinois State Medical Society; aged 67; died, Dec. 29, 1939, in St. Mary's Hospital, Centralia, of pneumonia.

Theodore Henry Wheeler, Los Angeles; Eclectic Medical College of Indiana, Indianapolis, 1903; Central College of Physicians and Surgeons, Indianapolis, 1904; served during the World War; aged 69; died, Nov. 22, 1939.

Joseph Johnson Waller, Oliver Springs, Tenn.; Southern Medical College, Atlanta, Ga., 1892; member of the Tennessee State Medical Association; aged 72; died, Dec. 8, 1939, of coronary thrombosis and hypertension.

James McCrea ● Fulda, Minn.; McGill University Faculty of Medicine, Montreal, Que., Canada, 1894; past president of the Murray County Medical Society; aged 76; died, Dec. 19, 1939, of carcinoma of the rectum.

George William Krick, West Pittston, Pa.; Hahnemann Medical College and Hospital of Philadelphia, 1913; served during the World War; aged 50; died, Dec. 17, 1939, in the Homeopathic Hospital, Reading.

Charles Edward Fawcett ● Stewartville, Minn.; Northwestern University Medical School, Chicago, 1893; bank president and president of the school board; aged 70; died, Dec. 8, 1939, of coronary thrombosis.

Ephraim W. Bogardus, Geneva, N. Y.; University of Buffalo School of Medicine, 1883; member of the Medical Society of the State of New York; aged 86; died, Dec. 17, 1939, of chronic myocarditis.

James Otis Carrington, Darby, Pa.; Howard University College of Medicine, Washington, D. C., 1913; on the staff of the Mercy Hospital, Philadelphia; aged 56; died, Dec. 2, 1939, of coronary occlusion.

Philip Aloysius Lonergan, Dickson, Pa.; University of Pennsylvania School of Medicine, Philadelphia, 1909; served during the World War; aged 54; died, Dec. 16, 1939, of heart disease.

James Aloysius Mulligan, Union City, N. J.; Atlantic Medical College, Baltimore, 1909; aged 60; died, Dec. 7, 1939, in St. Mary's Hospital, Hoboken, of arteriosclerosis and heart disease.

Walter J. Dickson, Nashville, Ga.; Atlanta College of Physicians and Surgeons, 1906; county physician; member of the school board; aged 61; died, Dec. 21, 1939, of typhus fever.

Vernon Voorhees Rood, Grass Valley, Calif.; College of Physicians and Surgeons, Los Angeles, 1916; member of the California Medical Association; aged 60; died, Nov. 16, 1939.

John Fred Yonkman, Grand Rapids, Mich.; University of Michigan Medical School, Ann Arbor, 1923; served during the World War; aged 45; died, Dec. 14, 1939, of brain tumor.

Gisle Biornstad, Minneapolis; University of Minnesota College of Medicine and Surgery, Minneapolis, 1894; aged 72; died, Dec. 29, 1939, of hypertension and coronary disease.

Francis Howard Finley, Finleyville, Pa.; College of Physicians and Surgeons, Baltimore, 1895; bank president; aged 68; died, Dec. 25, 1939, of bronchopneumonia.

James Persinger McNeil ● Kingsport, Tenn.; Vanderbilt University School of Medicine, Nashville, 1919; aged 44; died, Dec. 24, 1939, of acute monocytic leukemia.

Edward Ayers Johnston, Minneapolis; Hahnemann Medical College and Hospital, Chicago, 1903; aged 70; died, Dec. 30, 1939, of carcinoma of the prostate.

Horace Clare Peabody, Sisseton, S. D.; Chicago College of Medicine and Surgery, 1916; aged 55; died, Dec. 14, 1939, in a hospital at Webster of heart disease.

Benjamin Franklin Barnes, Elm City, N. C.; University of Maryland School of Medicine, Baltimore, 1902; aged 62; died, Dec. 31, 1939, of cerebral hemorrhage.

John W. Little, Westerville, Ohio; Starling Medical College, Columbus, 1881; aged 80; died, Dec. 29, 1939, of chronic nephritis, arteriosclerosis and influenza.

William S. Parks, Wapello, Iowa; State University of Iowa College of Medicine, Iowa City, 1885; aged 80; died, Dec. 10, 1939, of coronary thrombosis.

George Nathaniel Plummer Mead ● Winchester, Mass.; Harvard Medical School, Boston, 1886; aged 80; died, Dec. 14, 1939, of coronary heart disease.

Olin Carl Diehl, Diller, Neb.; John A. Creighton Medical College, Omaha, 1902; aged 67; died, Dec. 20, 1939, of injuries received in an automobile accident.

William F. Justus, Rushville, Ill.; College of Physicians and Surgeons, Keokuk, Iowa, 1892; county coroner; aged 71; died, Dec. 27, 1939, of myocarditis.

Elmer Ellsworth Faulkner, Minneapolis; Hahnemann Medical College and Hospital, Chicago, 1889; aged 78; died, Dec. 4, 1939, of coronary sclerosis.

Ramon Roca, San Jose, Calif.; Universidad de Barcelona Facultad de Medicina, Spain, 1889; aged 76; died, Nov. 12, 1939, of carcinoma of the prostate.

Beverly Washington Hall, Mountville, Ga.; University of Georgia Medical Department, Augusta, 1891; aged 74; died, Dec. 10, 1939, of heart disease.

Elihu Culbertson, Savannah, Ohio; University of Wooster Medical Department, Cleveland, 1880; aged 83; died, Dec. 21, 1939, of cerebral hemorrhage.

Harry Wadsworth Slack, Corsica, Pa.; Western Pennsylvania Medical College, Pittsburgh, 1895; aged 70; died, Dec. 9, 1939, of hernia.

Manley Blevins, Warrensville, N. C. (licensed in North Carolina in 1885); aged 80; died, Dec. 9, 1939, of perforated ulcer of the stomach.

James Rufus Speight, Robbinsville, N. C.; Medical College of Virginia, Richmond, 1890; aged 73; died, Dec. 14, 1939, of cerebral hemorrhage.

Benjamin Edward Robinson, Boston; Leonard Medical School, Raleigh, N. C., 1904; aged 60; died, Nov. 26, 1939, of coronary thrombosis.

Henry Bell Pratt, Yakima, Wash.; Syracuse University College of Medicine, 1903; aged 63; died, Dec. 22, 1939, of coronary thrombosis.

Samuel Clark Russwurm, Hughes, Ark.; Memphis (Tenn.) Hospital Medical College, 1899; aged 70; died, Dec. 21, 1939, of coronary thrombosis.

Samuel H. Reynolds, Maplewood, Mo.; Barnes Medical College, St. Louis, 1897; aged 70; died, Dec. 15, 1939, of chronic myocarditis.

John Aloysius Lotz, St. Louis; St. Louis University School of Medicine, 1906; aged 62; died, Dec. 26, 1939, of coronary disease.

Colin Henry Ross, Omaha; Omaha Medical College, 1898; aged 76; died, Dec. 17, 1939, in Chattanooga, Tenn., of bronchopneumonia.

Clark Lee Shipley, Paris, Ill.; St. Louis College of Physicians and Surgeons, 1908; aged 57; died, Dec. 24, 1939, of hemiplegia.

Franklin P. Hulen, Wichita, Kan.; Missouri Medical College, St. Louis, 1885; aged 82; died, Dec. 20, 1939, of cardiorenal disease.

Alvin Barnard Cary, Donnellson, Ill.; Marion-Sims College of Medicine, St. Louis, 1899; aged 63; died, Dec. 27, 1939, of heart disease.

W. T. Green, Dayton, Tenn.; Chattanooga Medical College, 1892; aged 77; died in December 1939 of chronic myocarditis and nephritis.

William Heitmann, Nashotah, Wis.; Milwaukee Medical College, 1902; aged 64; died, Dec. 17, 1939, of cerebral hemorrhage.

John W. Myers, Glen Dale, W. Va.; College of Physicians and Surgeons, Baltimore, 1893; aged 68; died, Dec. 19, 1939, of pneumonia.

Samuel E. Embry, Chicago; Louisville (Ky.) Medical College, 1891; aged 82; died, Dec. 26, 1939, of fracture of the femur.

Joseph Hoffmaster Campbell, Rutledge, Tenn. (licensed in Tennessee in 1889); aged 81; died, Dec. 9, 1939, of angina pectoris.

Alexander G. Low, Hartwood, Va.; Chicago Homeopathic Medical College, 1899; aged 76; died, Dec. 3, 1939, of angina pectoris.

Maskel Lee, Atlanta, Ill.; Rush Medical College, Chicago, 1888; aged 84; died, Dec. 20, 1939, of heart disease.

J. P. Joyce, Lexington, Tenn. (licensed in Tennessee in 1889); aged 74; died, Dec. 27, 1939.

Correspondence

EFFECT OF BASIC SCIENCE LAWS

To the Editor:—The so-called basic science law was, I believe, originally intended to curb the osteopath and the chiropractor. As it operates at present, it is curbing the medical profession effectively as well. The basic science law in most states requires examination in five or six subjects. Each subject represents one year's work in that subject. It is obvious that adequate preparation for such an examination in the case of a man who has been out of school a goodly number of years is a large order. As a rule there is no reciprocity on the basic science examination, and this, together with the fact that examinations are held at comparatively long intervals, makes it an effective bar when registration is attempted.

No one will hold a location open long enough to complete a deal under these circumstances, and even for recent graduates it adds a definite degree of uncertainty. In their efforts to be fair, most boards feel that they can make no exception in favor of the medical profession, although the law was intended primarily for the nonmedical cults.

As it stands at present, it constitutes a Chinese wall for the average man who is not a recent graduate.

PAUL R. HOWARD, M.D., Oak Park, Ill.

[The letter was referred to the office of the Bureau of Legal Medicine and Legislation, which replies:]

To the Editor:—Basic science laws have never been advocated as an ideal type of legislation. They do, however, represent the most practical approach to a solution of the muddle in which medical licensure has been permitted to flounder in many of the states. A few years ago this bureau undertook to find out the views on basic science laws of state medical associations of those states in which a basic science requirement had been imposed on all applicants for licenses to practice the healing art. There was a surprising absence of complaint against such laws received from such associations. As a matter of fact, during the last fifteen years few criticisms of the principles underlying basic science laws have reached this bureau.

The burden of the grievance against basic science laws seems to be that they interfere with the customary reciprocal relations that normally exist between states in the matter of medical licensure. Generally speaking there should be no such interference. The draft of a uniform basic science act prepared by this bureau was so framed as to avoid just that result. It provides for exemption from the basic science examination of any person who submits to the basic science examining board satisfactory proof showing:

> (1) that the applicant has passed in another state an examination in the basic sciences either before a board of examiners in the basic sciences or before a state board authorized to issue licenses to practice the healing art;
>
> (2) that the requirements of that state are not less than those required by this act as a condition precedent to the issuance of a license; and
>
> (3) that the board of examiners in the basic sciences in that state grant like exemption from examination in the basic sciences to persons holding certificates from the state board of examiners in the basic sciences of . . . . or holding licenses to practice the healing art according to the method or school that the applicant proposes to follow, issued after examination by the proper license board of . . .

While there is some variance in the phraseology used in the reciprocity provisions in the several basic science acts that have been enacted, all but three (Arizona, Florida and Washington) do authorize the respective basic science examining boards to give credit to examinations passed by the applicant in the basic sciences in other states. In Arkansas, for example, the reciprocity provisions in the law follow closely the provisions incorporated in our uniform draft. While the Arkansas act does not make it mandatory that the board grant exemption from examination to licentiates from other states, having proper qualifications, it does lodge with the board a discretionary right to do so. For instance, Arkansas, in 1938 115 applicants were granted basic science certificates, of which forty-three were issued without examination or were so-called reciprocity certificates. In Iowa, as another example, 115 certificates were issued during that year, seventy without examinations. In the District of Columbia, forty-six certificates were issued during 1938, twenty-two being without examination. In all the states having a basic science law in operation during 1938, a total of 1,388 certificates were issued, 293 of which were without examination. These figures were published in THE JOURNAL April 29, 1939, page 1724. Corresponding figures for 1939 will be published in the State Board Number of THE JOURNAL for this year. During 1938, however, no reciprocity certificates were issued in four states (Arizona, Connecticut, Oklahoma and Washington). In only two of these states, however, was the failure to issue so-called reciprocity certificates due to the fact that the laws contained no provision therefor, those states being Arizona and Washington. Some difficulties have arisen in connection with the enforcement of the Arkansas basic science act, but most of these difficulties were cleared up by a recent decision of the Supreme Court of Arkansas.

There have been several instances in the past in which complaints have been voiced against basic science legislation on the ground of interference with reciprocal relations between the states. These instances have been rare and in many of them an investigation has disclosed the fact that the alleged interference was due not to any fault in the legislation itself but to administrative practices.

Dr. Howard refers to the fact that there are comparatively long intervals between examinations in basic science and that this works a hardship on applicants. In this connection, if he has in mind Arkansas, the act does not specify the dates on which examinations are to be held. It provides merely that "the board shall conduct examinations at such times and places as it deems best, having due regard to the times and places of the examinations held by the several professional examining boards authorized to issue licenses to practice the healing art in the state of Arkansas."

BUREAU OF LEGAL MEDICINE AND LEGISLATION
OF THE AMERICAN MEDICAL ASSOCIATION.

LIPOCAIC AND PANCREATIC EXTRACTS

To the Editor:—I was much interested in the article in THE JOURNAL January 6 by Dragstedt in which he calls attention to a substance present in the pancreas which he calls lipocaic. It might be of some aid to those interested in the subject of diabetes and disturbances of fat metabolism, as well as atherosclerosis, to know that a number of our men have been using the pancreatic extract described by Dr. Wolffe, of Philadelphia, and his co-workers, in cases of angina pectoris and diabetic gangrene, with most encouraging results. For this reason I feel that we should call to the attention of the profession that work on hormones of the pancreas, other than insulin, has been done by the Wolffe group at Temple University. There is a rich bibliography to which the Dragstedt group fails to refer.

Is Dr. Dragstedt's preparation much different from the one described by Dr. Wolffe or is it possible that he just overlooked it? In one of the recent articles, "Pancreatic Extract (Enzyme Free) in the Treatment of Diabetic and Arteriosclerotic Gangrene" (*Am. J. Surg.* **43**:109 [Jan.] 1939) Dr. Wolffe says: "The active substance present in the enzyme-free pancreatic extract, which is neither histamine nor choline, exerts a beneficial influence upon lipoid metabolism as well as on muscle metabolism in general. As a corollary to this, it may be that the combination of insulin, pancreatic extract and a diet low in fats will prevent the early appearance of atherosclerosis in diabetes, etc."

The same group showed that their substance, prepared in a similar fashion to that of Dragstedt, had fat influencing proper-

ties, before the International Congress in Rome in 1932, and in Leningrad in 1935. The first publication in reference to the extract appeared in the *Transactions of the American Therapeutic Society* for January 1931. Following this, one appeared in the *Annals of Internal Medicine* for November 1931. Some of the work was published in the *Archives internationales de pharmacodynamie et de thérapie* 66:387 (March 15) 1933.

The Wolffe group also exhibited their work at the 1937 meeting of the New Jersey State Medical Society. An abstract of the presentation was published in 1938.

BARNEY LIHN, M.D., Vineland, N. J.

[NOTE.—This letter was referred to Dr. Dragstedt, who replies:]

To the Editor:—The papers of Dr. Wolffe have been for the most part published in obscure medical journals which it has been difficult for me to obtain. Through the courtesy of the American Medical Association Library I have secured a copy of the *Proceedings of the Fifteenth International Physiological Congress*, which was held in Leningrad in 1935 and which contains the abstract of a paper by Dr. Wolffe and his associates entitled "Desympatone—A Fraction of Insulin-Free Pancreatic Extract." Apparently Dr. Wolffe has secured an extract from pancreas which when injected intravenously into rabbits and dogs produces a definite but transitory fall in blood pressure and which in some way seems to antagonize the pressor action of epinephrine. I have been unable to find in any of the publications of this group any evidence indicating that this extract resembles lipocaic in its effect on the fatty infiltration in the liver of depancreatized dogs or on fat metabolism and transport in a general way.

It is my impression that Wolffe has been following up the work of Frey on the possible presence of what is called a circulatory hormone obtained in extracts of pancreas that are given by parenteral injection. I believe it still remains a question as to whether or not the depressor effects of such extracts are specific for the pancreas or whether they simply represent the well known depressor effects of tissue extracts in general when injected intravenously in experimental animals.

LESTER R. DRAGSTEDT, Chicago.
Professor of Surgery, University of Chicago.

To the Editor:—In 1936 I got in touch with Dr. Wolffe, after seeing the type of work he was doing with various fractions of pancreatic extract, and asked him to prepare an exhibit for the 1937 meeting of the New Jersey State Medical Society.

Dr. Wolffe and his colleagues showed conclusively that the pancreas contained hormones which differ from insulin. One they described as having an epinephrine neutralizing effect. This had previously been shown by a number of investigators, such as Frey and Kraut, Gley and Kisthinios, and Vaquez and his co-workers. Dr. Wolffe's group demonstrated modifications of the previously reported method of preparation of this particular fraction, its possible isolation and new methods for standardization. They gave due credit to the previous investigators.

In their exhibit they also showed that the pancreas contains a hormone which influences fat metabolism and which to the best of their knowledge had not been reported before. They called this substance lipolysin.

They showed that the continued administration of the epinephrine neutralizing fraction and the fat influencing fraction was a promising therapeutic agent for patients suffering from angina pectoris and intermittent claudication. They explained its actions by its power to neutralize epinephrine, to stabilize the autonomic system and by stimulating fat metabolism, thereby aiding muscle metabolism.

They reported a series of cases showing the beneficial effects obtained by the use of these two fractions in combination with insulin in patients suffering from diabetes and atheromatosis. They urged the use of these materials from the pancreas for the relief of angina pectoris in patients suffering from diabetes, in gangrene seen in patients suffering from diabetes mellitus, and in early cases of gangrene.

Dr. Wolffe and his co-workers brought with them a number of patients whom they had treated at Temple University Hospital and at the Wolffe Clinic and demonstrated the method of treatment.

I examined their exhibit very carefully and I was sufficiently impressed with the work to ask Dr. Wolffe to write a summary of the work presented. This was published in the *Journal of the New Jersey State Medical Society* in March 1938. They were also given an award for this exhibit.

In THE JOURNAL of January 6 I read Dr. Dragstedt's article with great interest. He approaches the same problem from a somewhat different point of view, but he confirms the work presented by Dr. Wolffe and his co-workers.

I am writing this letter in the spirit of fair play, as well as to point out that in reporting therapeutic advances each individual should refer to the work done by previous investigators. It would make it much easier for the general profession to follow these advances.

It is quite possible that Dragstedt and his co-workers are not acquainted with Dr. Wolffe's work, although they have quite an extensive bibliography.

ASHER YAGUDA, M.D., Newark, N. J.

SAFE TRANSPORT FOR THE UNCONSCIOUS PATIENT

To the Editor:—The missing link in the effective treatment of acute asphyxial accidents was forged a short time ago in an asphyxial emergency which took place between the state of New Jersey and the state of New York. It has heretofore been the common practice to treat the patient who has been suffocated at the site of the accident. The patient either recovers or dies "on location." This practice has been due to the fact that adequate facilities have not been available for the treatment of the patient en route from the site of the accident to the hospital. January 9 a call was received to attend a woman aged 35 residing in New Jersey who had suddenly become unconscious, whose respirations had failed and whose life was being maintained by a modified prone pressure Schafer technic. When I arrived at the site of the accident I rolled the patient over on her back and, after laryngoscopy, instituted intubation; oxygen and carbon dioxide were insufflated into the endotracheal tube under measured pressure. During the next five hours of artificial respiration by intermittent insufflation the patient was given a transfusion and the circulation was stimulated by hypodermatic injections.

In the absence of a palpable radial and temporal pulse but with a regular apex beat of 100 a minute, the finger nails and ears being pink at the end of a total period of nine hours of artificial respiration, without any voluntary effort having taken place the patient was transported under endotracheal insufflation down narrow winding stairs, backed into an ambulance and, preceded by a police car, carried for a distance of some 15 miles, across the state line of New Jersey to a Manhattan medical center. She was removed from the ambulance, still under insufflation, to the hospital stretcher, taken up on the elevator and placed in the respirator under oxygen insufflation treatment. Auscultation of the heart on transfer to the respirator by the physician who had checked this observation before removal indicated that there had been no change in the circulation by reason of transportation. The patient survived approximately five hours in the respirator, the circulation finally failing and death ensuing.

Postmortem examination revealed cerebellar hemorrhage. Careful inspection of the respiratory tract revealed no evidence of trauma to the glottis or trachea and no emphysema or other evidence of air pressure in the lung tissue.

This case is believed to be of historical importance because it demonstrates the feasibility of transporting safely the patient who has ceased to breathe. Every profoundly asphyxiated patient and every patient exposed to unconsciousness and asphyxia during transportation is entitled to the benefit of the relatively simple technic demonstrated and successfully employed in this case. It is neither difficult nor costly to condition ambulances for the safe transportation of the unconscious patient.

PAUL J. FLAGG, M.D., New York.
Director of Activities, Society for the
Prevention of Asphyxial Death, Inc.

Queries and Minor Notes

THE ANSWERS HERE PUBLISHED HAVE BEEN PREPARED BY COMPETENT AUTHORITIES. THEY DO NOT, HOWEVER, REPRESENT THE OPINIONS OF ANY OFFICIAL BODIES UNLESS SPECIFICALLY STATED IN THE REPLY. ANONYMOUS COMMUNICATIONS AND QUERIES ON POSTAL CARDS WILL NOT BE NOTICED. EVERY LETTER MUST CONTAIN THE WRITER'S NAME AND ADDRESS, BUT THESE WILL BE OMITTED ON REQUEST.

DRY NOSE AND THROAT IN FLOUR WORKER

To the Editor:—A man aged 42, employed in a flour mill, has for many years had trouble with his nose and throat, which has been variously diagnosed as sinus trouble, catarrh and irritation from flour dust. It has taken the form of dryness in the nose and throat, and he is continually trying to clear his throat. He states he feels as though there are scabs on the superior surface of his soft palate and is continually hawking, in an effort to get these scabs off his palate, and claims he does spit out large, dry, scablike pieces of dried phlegm at times. When first seen, about one and a half years ago, he seemed to have a chronic rhinitis. This has cleared up under treatment. He was treated for some time by a specialist, was given five or six roentgen treatments and has had a course of vaccine. On examination now, his nose and throat are essentially normal except for a dry, glazed appearance of the mucosa, which is most marked on the posterior pharyngeal wall. All treatment has been without success. He does seem to get some comfort from the instillation of liquid petrolatum into his nose. I suggested the use of amniotin in oil as a spray and the patient used this for about three weeks but did not continue after his first supply ran out. I also suggested that he change his employment but this he is unable to do at present. Any suggestions you might be able to make as to treatment would be appreciated. M.D., Virginia.

ANSWER.—From the description of the case it is apparent that the nasal condition is partly due to continuous irritation of the flour dust. Since this man cannot change his employment at present, it is imperative that a course of therapy be given him at the office and some procedures outlined for him at home with the view to protecting the nasal and pharyngeal mucosa, promoting nasal function and improving the general health.

Nasal irrigation with warm physiologic solution of sodium chloride, with or without sodium bicarbonate, or a simple isotonic alkaline solution will cleanse the nasal fossae adequately. If the nasal secretion or crusts have an offensive odor, a solution of potassium permanganate 2 grains to the pint of warm water may be substituted for the warm saline solution and gently irrigated into the nasal fossae. The crusts will come out in the washing leaving the entire nasal mucosa free. An application of ichthammol N. F. (10 per cent in glycerin) or one of the iodine preparations (iodine 2 Gm., potassium iodide 8 Gm., glycerin 150 cc.) to the nasal mucosa will promote the circulation of blood. It is best to follow with a bland oil spray, such as camphor, menthol and petrolatum. The stimulating solutions should be changed every now and again, to further enhance the end results.

The patient should be given instruction in the use of some suitable rubber bulb or siphon appliance so that he would be able to irrigate his nose once or twice daily without any untoward effects toward his sinuses or middle ears, and to snuff up or apply with a cotton tipped applicator a stimulating preparation along the lines of the foregoing, and follow with a spray of liquid petrolatum.

His general health should be built up to the highest possible level; the diet to consist of abundance of greens, fruits, vitamins, minerals, proteins and the like; any faults of systemic nature to be corrected and colds to be combated.

If any of the stimulating preparations are poorly tolerated or irritate unduly, they must immediately be discontinued and another substituted forthwith. Occasionally a mucosa will be found to be "sensitive" to one or more of the drugs, and because of this, it is best to abandon the use of such drugs for a time at least.

INDUSTRIAL OCCUPATION AND PREGNANCY

To the Editor:—What do you consider the best obstetric advice regarding working on the part of pregnant women, particularly in the textile industry, where there may be much reaching and pulling? Some state laws forbid pregnant women, after the fourth or fifth month, to work in any manufacturing business. Do you think it wiser to prohibit pregnant women, at any stage, to work in any industrial capacity and thus prevent the possibility of abortion and complications? Most of these women also have their own housework to do, besides working eight hours a day. Do you think this practice conducive to the good of the patient and the fetus? Isn't one purpose of modern antepartum care to warn against strenuous activity? Bernard S. Dignam, M.D., Thompsonville, Conn.

ANSWER.—No standard rules can be formulated as to the desirability of women continuing to work in industry during pregnancy. Economic factors must often carry considerable weight in any decisions in this regard. Certain general principles can be stated. Pregnant women should not continue their occupations if they are exposed to toxic hazards, particularly lead or other heavy metals. Pregnant women should not be subjected to an increased occupational hazard of infection. Occupations which subject women to excessive muscular efforts during which the intra-abdominal pressure is likely to be increased may be dangerous. Physical and mental efforts must not lead to exhaustion.

The moderate amount of physical exertion in the average occupation does not increase the hazards of pregnancy. Abortion is not increased in frequency. Normal pregnant women who have worked prior to the onset of gestation can usually continue their work until the beginning of the last trimester without harm to themselves. It is often desirable for a pregnant woman to be occupied in order to maintain a well balanced mental state.

TRAUMATIC MYDRIASIS

To the Editor:—A man was struck on the eye about one month ago by a hard object. There was no reaction at that time, with the exception of blurred vision in that eye. He came to see me one week later because of this condition. I could find nothing but a dilated pupil. This contracted with pilocarpine and his normal vision was restored. He has been under pilocarpine for three weeks because if he stops the drug for even one day the pupil dilates and, of course, his vision becomes blurred again. Would you please tell me the best procedure for a case of this type. I would also like to know the prognosis and treatment, if any. M.D., New Hampshire.

ANSWER.—Traumatic mydriasis is usually due to a slight rupture of the iris sphincter, which sometimes can be seen only with a corneal microscope. If the sphincter is ruptured, treatment is usually of no value except that a miotic can be used at any time when it is desired to contract the pupil. This would apply especially to exposure to bright sunlight. When the nerve supply to the sphincter is injured, which seems to occur occasionally, there is a tendency for the function of the pupil to become restored. Usually if restoration is to occur it will show some signs of doing this within three to six months.

FRACTURES OF NOSE

To the Editor:—What is the best first aid treatment of a fracture of the nose, either bone or cartilage? Jean S. Feldheym, M.D., San Francisco.

ANSWER.—The order of procedure is usually as follows: 1. Hemostasis. 2. Adequate cleansing of the parts. 3. Readjustment of the displaced tissues.

Hemostasis is accomplished by removing the initial clots from the nasal passages, gentle irrigation with sterile physiologic solution of sodium chloride and, if bleeding continues, the insertion of cotton plugs moistened with epinephrine. If the external parts are lacerated, bleeders should be sought for and clamped off. It is best not to use ligatures since buried catgut frequently favors secondary infection. Cleansing should be thorough by using a brush with soap and water. Foreign particles should be carefully removed. Fragments of bone which may be present in compound fractures should not be removed, since they frequently regain their vitality and therefore avoid the necessity of subsequent plastic procedures to restore the normal contour. Antitetanic serum should be given in all doubtful cases.

If seen early before much swelling has taken place the fractured bones and cartilages should be replaced immediately. This is done by combined intranasal and external manipulation. For

the former it is best to employ any smooth flat instrument such as a dull septum elevator, with which it is possible to elevate depressed or overriding fragments. (The Salinger fracture instrument has a grip handle which facilitates this maneuver.) At the same time the fingers of the other hand on the outside of the nose control the movement of the fragments and determine the resulting contour. If the nasal cartilages have been lacerated they should be accurately approximated with silk sutures placed closely enough together to prevent curling of the cut margins, which would result in a disfiguring scar. If, after reduction, the bony fragments tend to sink toward the nasal interior, they may be held in place by a light oil soaked pack wedged between the septum and nasal bones. If the nasal bridge tends to spread or deviate, it may be retained by a molded copper splint or a stent of dental modeling compound. Undue pressure must in all cases be avoided, since pressure necrosis of the skin is always a possibility.

If a case is seen at a time when swelling has already appeared to a degree which masks the deformity, repositioning of the fragments should be delayed two or three days until the application of cold compresses has reduced the swelling.

ABSORPTION OF LEAD AND ARSENIC THROUGH SKIN

To the Editor:—A man aged 25, an employee for several years of a local shoe factory, came to me in March 1939 complaining of blurring of vision. Central vision in his right eye was 0.2—1. In his left eye he counted fingers at 18 inches. On examination the eyes were completely normal externally. The fundi also were normal, except for questionable slight atrophy of the temporal half of the left disk, and perhaps slight engorgement of the retinal veins. The peripheral fields were normal but there was a large central scotoma in each eye. A diagnosis of bilateral retrobulbar neuritis was made. Examination of his sinuses, teeth and tonsils revealed no abnormal clinical observations. Roentgenograms of his sinuses were normal and x-ray examination of the optic foramina showed that they were of normal size. General and neurologic examinations were entirely negative. Urine and blood examinations gave normal results. Blood and spinal fluid Wassermann reactions were negative, and the Bence-Jones and Hoguchi tests were also negative. The patient was hospitalized and given foreign protein therapy from April 10 to June 25; this was given in the form of typhoid vaccine, intravenously, beginning with a small dose and gradually working up to a final dose of 350,000,000. The patient at first always had a good febrile reaction. After one of the early injections a small hemorrhage appeared in the right eye. The injections were stopped for a time and then cautiously begun again. The hemorrhage disappeared and there were no more. During this time the patient received also potassium iodide, in increasing dosage, and vitamin B therapy. He had previously used tobacco moderately and considered small amounts of alcoholic liquor. Nonspecific during his stay at the hospital he had none of either. There was steady improvement of vision for several weeks, so that vision in the right eye, which had decreased from 0.2—1 to 10/200, gradually improved to 0.1. Vision in the left eye improved to 7/200. However, in the first part of June vision again began to decline and definite atrophy of both disks began to be manifest. In July the patient was referred to the Wisconsin General Hospital, at which the diagnosis was also chronic bilateral retrobulbar neuritis. A chemical examination of the patient's blood and urine was made at the department of pharmacology and toxicology, which revealed that 19.79 Gm. of blood contained 0.824 mg. of lead, 100 Gm. of blood contained 0.121 mg. of lead, 910 cc. of urine contained 0.073 mg. of arsenic trioxide and 910 cc. of urine contained 0.0577 mg. of lead. Examination of the fluid in which the patient had constantly dipped his hands while in the employ of the shoe factory revealed that it was a water emulsion of some fatty substance and contained 0.2 mg. of arsenic (expressed as As_2O_3) and 0.48 mg. of lead per hundred cubic centimeters of solution. Is it possible that the patient's retrobulbar neuritis could be due to lead and arsenic? Is it possible that such minute amounts in the solution he used could produce such a marked effect on his optic nerves? Should this be considered a medicolegal case and the shoe factory be made responsible for the patient's loss of vision? There were at no time any other evidences of lead poisoning.

M.D., Wisconsin.

ANSWER.—Absorption of lead and arsenic through the skin does not occur to an appreciable degree as the result of contact with aqueous solutions or suspensions of lead and arsenic compounds in the concentrations reported, and it is improbable that significant quantities would be ingested because of contaminated hands. The analytic data, obtained some months after the cessation of the occupational exposure, are unconvincing. The urinary lead concentration of 0.03 mg. per liter is well within normal limits. The urinary arsenic concentration, while somewhat higher than that of lead, is also within the upper range of normal values. The one result that suggests abnormal lead absorption was that obtained on the blood. This result is quite inconsistent with the urinary lead concentration and cannot be accepted as valid without confirmatory analyses. Large amounts of potassium iodide may induce the removal of lead from the bones and thus provoke increased lead content of the blood and an increased excretion of lead by way of the kidneys. In the absence of clinical evidences of lead absorption, the result on the blood is still more questionable. One must conclude that a diagnosis of neuritis due to lead or arsenic has not been established and that, as the case has been presented, there are no grounds for placing responsibility on the employer.

SILICOSIS AND PROPHYLACTIC ALUMINUM

To the Editor:—I have been told by patients of a new silicosis "cure," presented in an exhibit at the world's fair in San Francisco last summer. I have no definite information regarding this new treatment, but it has been described as the inhalation of some aluminum compound. I would appreciate having any information concerning this treatment that you may have available.

Robert S. Smith, M.D., Boise, Idaho.

ANSWER.—At the University of Toronto, experiments dealing with silicosis have been under way for some time. The most recent experiments have dealt with the effect of aluminum dust. Experimentally it has been shown that aluminum dust in concentrations of less than 1 per cent in mixtures of silica dust will prevent the development of silicosis in experimental animals. The effects of other mineral dusts on the development of silicosis in animals has also been studied there and at other laboratories. Sufficient time has not yet elapsed for full evaluation of the merit of this mode of prevention. Certainly it cannot replace adequate medical and engineering control. There is no knowledge of its adequate trial in man; such an experiment would, of course, require many years and would be most costly.

If this procedure is of value, it is useful only in prevention; it is of no therapeutic value once the disease (silicosis) is established.

A full report of the basic work in this problem has been presented by J. J. Denny, W. D. Robson and D. A. Irwin (The Prevention of Silicosis by Metallic Aluminum: A Preliminary Report, *Canad. M. A. J.* **37**:1 [July] 1937; The Prevention of Silicosis by Metallic Aluminum: II, ibid. **40**:213 [March] 1939; The Prevention of Silicosis by Metallic Aluminum: A Study of the Effect of Metallic Aluminum—Its Mode and Permanence of Action, Effective Dosage and Methods of Administration, *Industrial Med.* **8**:133 [April] 1939).

SPRUE

To the Editor:—In Queries and Minor Notes in The Journal Dec. 30, 1939, page 2445, there is an answer to a question entitled "Probable Sprue." It seems to me that the individual who answered this question has put The Journal on record as being out of date in the diagnosis of sprue. Taking up the specific questions asked: 1. The data given certainly do not substantiate a diagnosis of sprue. 2. The finding of Monilia has nothing whatever to do with the diagnosis. 3. Further investigation certainly should include adequate stool examination both for bacteria and for protozoa, sigmoidoscopic examination and gastric analysis. 4. The consumption made is not borne out by the letter of inquiry, and the advice to give potassium iodide is simply nonsense. Incidentally, what is meant by the "alterative action" of potassium iodide? 5. The dextrose tolerance test is of decided importance in a case such as this and might even lead the way to diagnosis with reference to sprue. All in all, I consider the answer to the question unsatisfactory and inadequate.

Alfred C. Reed, M.D., San Francisco.

To the Editor:—In the Dec. 30, 1939, issue of The Journal, the reply to a query concerning a probable case of sprue seemed inadequate and also somewhat inaccurate. In the opinion of most of the recent workers in this field, the finding of Monilia in the stool of the patient is of no definite diagnostic value. The suggested use of potassium iodide in therapy has no rational basis. As aids in diagnosing the patient's ailment, the following procedures would be helpful: 1. Stool fat content, the dietary intake of fat being known. On the usual diet the patient with sprue will have steatorrhea with a marked increase in the stool fatty acids. If the diet is low in fat, however, steatorrhea may not be found, for it is largely dependent on the dietary intake of fat (Bassett, S. H.; Kaufmann, H.; Hyde, H. V., and Van Alstine, H. L.: *J. Clin. Investigation* **18**:121 [Jan.] 1939). 2. X-ray examination of the small intestine. In sprue this will reveal variations in caliber, pachetites, segmentation, mucosal changes and disturbances of motility (Mackie, T. T.; Miller, D. K., and Rhoads, C. P.: *Am. J. Trop. Med.* **15**:571 [Sept.] 1935). 3 Oral dextrose tolerance test. Contrary to the published reply, the oral dextrose tolerance test is of importance in sprue. The dextrose tolerance curve in sprue is usually low or "flat" (Thomson, T. E. Hem: Nontropical Sprue, London, Oxford University Press, 1932. Hanes, F. M., and McBryde, Angus: Identity of Sprue and Celiac Disease, *Arch. Int. Med.* **58**:1 [July] 1936). The probable causes for the "flat" curve will be discussed in a formal report at a later date, but for the present it may be stated that the following factors seem involved: (a) Slow absorption of dextrose from the small intestine (Green, Jakob: *New England J. Med.* **218**:247 [Feb. 10] 1938). (b) "Increased tolerance" for carbohydrate produced by (1) the high carbohydrate diet which is usually ingested by patients with sprue and (2) the high carbohydrate content of the diet actually absorbed by these patients. The passage of blood in the stool is unusual in sprue and warrants complete study of the lower gastrointestinal tract for other possibilities. It must be remembered that so-called symptomatic sprue as opposed to idiopathic sprue is a syndrome that may be produced by a variety of disorders of the intestinal tract. The diagnosis of the latter is made largely by exclusion. As for treatment, the best results have been obtained with large parenteral doses of relatively crude liver extracts and special diets which have been described by others (Miller, D. K., and Barker, W. Nelson: Clinical Course and Treatment of Sprue, *Arch. Int. Med.* **60**:385 [Sept.] 1937). Here again it should be stressed that in cases of some years' standing, response to treatment may be variable, slow and at times unsatisfactory.

Michael J. Lepore, M.D., New York.

Medical Examinations and Licensure

COMING EXAMINATIONS

NATIONAL BOARD OF MEDICAL EXAMINERS SPECIAL BOARDS

Examination of the National Board of Medical Examiners and Special Boards were published in THE JOURNAL, February 10, page 515.

STATE AND TERRITORIAL BOARDS

ALABAMA: Montgomery, June 18-20. Sec., Dr. J. N. Baker, 519 Dexter Ave., Montgomery.

ALASKA: Juneau, March 5. Sec., Dr. W. W. Council, Box 561, Juneau.

ARIZONA: *Basic Science.* Tucson, March 19. Sec., Dr. Robert L. Nugent, University of Arizona, Tucson.

ARKANSAS: *Basic Science.* May or June. Sec., Mr. Louis E. Gebauer, 701 Main St., Little Rock. *Medical* (Regular). Little Rock, June 6-7. Sec., Dr. D. L. Owens, Harrison. *Medical* (Eclectic). Little Rock, June 6-7. Sec., Dr. Clarence H. Young, 1415 Main St., Little Rock.

CALIFORNIA: *Oral examination* (required when reciprocity application is based on a state certificate or license issued ten or more years before filing application in California), San Francisco, April 17. *Written examination.* Los Angeles, Feb. 26-29. Sec., Dr. Charles B. Pinkham, 1020 N St., Sacramento.

CONNECTICUT: *Medical.* Hartford, March 12-13. Sec., Dr. T. P. Murdock, 147 W. Main St., Meriden. *Homeopathic.* Derby, March 12-13. Sec., Dr. Joseph H. Evans, 1488 Chapel St., New Haven.

DELAWARE: *Examination.* Dover, July 9-11. *Reciprocity.* Dover, July 16. Sec., Medical Council of Delaware, Dr. Joseph S. McDaniel, 229 S. State St., Dover.

DISTRICT OF COLUMBIA: *Basic Science.* Washington, April 22-23. *Medical.* Washington, May 13-14. Sec., Dr. George C. Ruhland, 203 District Bldg., Washington.

FLORIDA: *Basic Science.* De Land, May 25. Sec., John F. Conn, De Land. *Medical.* Tampa, June 17-18. Sec., Dr. William M. Rowlett, Box 786, Tampa.

GEORGIA: Atlanta, June. Joint-Sec., Mr. R. C. Coleman, 111 State Capitol, Atlanta.

IDAHO: Boise, April 2. Dir., Bureau of Occupational Licenses, Mr. H. B. Whittlesey, 355 State Capitol Bldg., Boise.

ILLINOIS: Chicago, April 2-4. Acting Superintendent of Registration, Mr. Lucien A. File, Springfield.

INDIANA: Indianapolis, June 18-20. Sec., Board of Medical Registration and Examination, Dr. J. W. Bowers, 301 State House, Indianapolis.

IOWA: *Medical.* Des Moines, March 4-6. *Basic Science.* Des Moines, April 9. Dir., Division of Licensure and Registration, Mr. H. W. Grefe, Capitol Building, Des Moines.

KANSAS: Kansas City, June 18-19. Sec., Board of Medical Registration and Examination, Dr. J. F. Hassig, 903 N. Seventh St., Kansas City.

KENTUCKY: Louisville, June 5-7. Sec., Dr. A. T. McCormack, 620 S. Third St., Louisville.

MAINE: Portland, March 12-13. Sec., Board of Registration of Medicine, Dr. Adam P. Leighton, 192 State St., Portland.

MARYLAND: *Medical.* Baltimore, June 18-21. Sec., Dr. John T. O'Mara, 1215 Cathedral St., Baltimore. *Homeopathic.* Baltimore, June 18-19. Sec., Dr. John A. Evans, 612 W. 40th St., Baltimore.

MASSACHUSETTS: Boston, March 12-14. Sec., Board of Registration in Medicine, Dr. Stephen Rushmore, 413 F State House, Boston.

MICHIGAN: Ann Arbor and Detroit, June 12-14. Sec., Dr. J. Earl McIntyre, 202-4 Hollister Bldg., Lansing.

MINNESOTA: *Basic Science.* Minneapolis, April 2-3. Sec., Dr. J. Charnley McKinley, University of Minnesota, 126 Millard Hall, Minneapolis. *Medical.* Minneapolis, April 16-18. Sec., Dr. Julian F. Du Bois, 350 St. Peter St., St. Paul.

MISSISSIPPI: Jackson, June. Asst. Sec., Dr. R. N. Whitfield, Jackson.

MONTANA: *Reciprocity.* Helena, April 1. *Examination.* Helena, April 2-3. Sec., Dr. S. A. Cooney, 216 Power Block, Helena.

NEBRASKA: Lincoln, June. Omaha, May 7-8. Dir., Bureau of Examining Boards, Mrs. Clark Perkins, 1009 State Capitol Bldg., Lincoln.

NEW HAMPSHIRE: Concord, March 14-15. Sec., Dr. T. P. Burroughs, State House, Concord.

NEW JERSEY: Trenton, June 18-19. Sec., Dr. Earl S. Hallinger, 28 W. State St., Trenton.

NEW MEXICO: Santa Fe, April 8-9. Sec., Dr. Le Grand Ward, 135 Sena Plaza, Santa Fe.

NORTH DAKOTA: Grand Forks, July 2-5. Sec., Dr. G. M. Williamson, 4½ S. Third St., Grand Forks.

OHIO: *Reciprocity.* Columbus, April 2. Sec., Dr. H. M. Platter, 21 W. Broad St., Columbus.

OKLAHOMA: *Basic Science.* Oklahoma City, May 9. *Medical.* Oklahoma City, June 5-6. Sec., Dr. James D. Osborn Jr., Frederick.

OREGON: *Basic Science.* Corvallis, July 6. Sec., State Board of Higher Education, Dr. Charles D. Byrne, University of Oregon, Eugene.

PUERTO RICO: Santurce, March 5. Sec., Dr. O. Costa Mandry, Box 3834, Santurce.

TEXAS: San Antonio, June 20-22. Sec., Dr. T. J. Crowe, 918-20 Mercantile Bldg., Dallas.

VIRGINIA: Richmond, June 18-20. Sec., Dr. J. W. Preston, 301½ Franklin Rd., Roanoke.

WEST VIRGINIA: Charleston, March 4-6. Sec., Public Health Council, Dr. Arthur E. McClue, State Capitol, Charleston.

WISCONSIN: *Basic Science.* Madison, April 6. Sec., Professor Robert N. Bauer, 3414 W. Wisconsin Ave., Milwaukee. *Medical.* Milwaukee, June 25-28. Sec., Dr. E. C. Murphy, 314 E. Grand Ave., Eau Claire.

District of Columbia Reciprocity Report

Dr. George C. Ruhland, secretary, District of Columbia Commission on Licensure, reports seven physicians licensed by reciprocity and one physician licensed by endorsement, December 22. The following schools were represented:

School	LICENSED BY RECIPROCITY	Year Grad.	Reciprocity with
Georgetown University School of Medicine		(1934)	Maryland
Howard University College of Medicine		(1935)	Maryland
University of Maryland School of Medicine and College of Physicians and Surgeons		(1932)	Maryland
University of Michigan Medical School		(1936)	Penna.
Washington University School of Medicine		(1937)	Missouri
Albany Medical College		(1901)	New York
Temple University School of Medicine		(1932)	Penna.
School	**LICENSED BY ENDORSEMENT**	**Year Grad.**	**Endorsement of**
Vanderbilt University School of Medicine		(1931)	N. B. M. Ex.

Florida November Examination

Dr. William M. Rowlett, secretary, Florida State Board of Medical Examiners, reports the written and practical examination held at Jacksonville, Nov. 13-14, 1939. Thirty-two physicians were examined, twenty-nine of whom passed and three failed. The following schools were represented:

School	PASSED	Year Grad.	Number Passed
Emory University School of Medicine		(1937), (1939)	2
University of Georgia School of Medicine		(1933)	1
Rush Medical College		(1932), (1937)	2
The School of Medicine of the Division of Biological Sciences		(1933)	1
Indiana University School of Medicine		(1930)	1
University of Louisville School of Medicine		(1938)	1
Louisiana State University Medical Center		(1935)	1
Tulane University of Louisiana School of Medicine		(1935), (1939) 2	
Johns Hopkins University School of Medicine		(1935)	1
Boston University School of Medicine		(1936)	1
University of Michigan Medical School		(1938)	1
Albany Medical College		(1936)	1
Cornell University Medical College		(1935)	1
Long Island College of Medicine		(1931), (1936)	2
University and Bellevue Hospital Medical College		(1917), (1928) 2	
University of Rochester School of Medicine		(1938)	1
Temple University School of Medicine		(1939, 3)	3
Medical College of the State of South Carolina		(1926)	1
Vanderbilt University School of Medicine		(1932)	1
Marquette University School of Medicine		(1935, 2)	2
Universität Bern Medizinische Fakultät		(1917)	1
School	**FAILED**	**Year Grad.**	**Number Failed**
University of Kansas School of Medicine		(1930)	1
Long Island College Hospital		(1921)	1
Friedrich Alexanders-Universität Medizinische Fakultät, Erlangen		(1922)	1

Mississippi December Reciprocity Report

Dr. R. N. Whitfield, assistant secretary, Mississippi State Board of Health, reports seventeen physicians licensed by reciprocity and one physician licensed by endorsement, December 5. The following schools were represented:

School	LICENSED BY RECIPROCITY	Year Grad.	Reciprocity with
University of Illinois College of Medicine		(1914)	New York
University of Louisville School of Medicine		(1934)	Kentucky
Louisiana State University Medical Center		(1937)	Louisiana
Tulane University of Louisiana School of Medicine		(1933), (1934)	Louisiana
Harvard Medical School		(1932)	California
University of Minnesota Medical School		(1938)	Louisiana
Miami Medical College		(1901)	Illinois
Meharry Medical College		(1936)	Tennessee
University of Tennessee College of Medicine		(1936, 2), (1937, 2)	Tennessee
Vanderbilt University School of Medicine		(1935)	Tennessee
Medical College of Virginia		(1932)	Minnesota
University of Virginia Department of Medicine		(1931), (1936)	Virginia
School	**LICENSED BY ENDORSEMENT**	**Year Grad.**	**Endorsement of**
Georgetown University School of Medicine		(1909)	N. B. M. Ex.

South Carolina November Examination

Dr. A. Earle Boozer, secretary, State Board of Medical Examiners of South Carolina, reports the written examination held at Columbia, Nov. 14, 1939. The examination covered seventeen subjects. Three candidates were examined, all of whom passed. Five physicians were licensed by reciprocity. The following schools were represented:

School	PASSED	Year Grad.	Per Cent
University of Arkansas School of Medicine		(1939)	80.6
University of Maryland School of Medicine and College of Physicians and Surgeons		(1934)	75
Harvard Medical School		(1936)	80
School	**LICENSED BY RECIPROCITY**	**Year Grad.**	**Reciprocity with**
Emory University School of Medicine		(1935)	Georgia
Meharry Medical College		(1938)	Tennessee
Vanderbilt University School of Medicine		(1938)	Tennessee
Medical College of Virginia		(1929)	N. Carolina
University of Virginia Department of Medicine		(1937)	Virginia

Book Notices

Industrial Dermatoses. Symposiums Presented at Meetings of American Medical Association and American Dermatological Association. Paper. Price, $1 each; $9 per 10 copies; $20 per 25 copies. Pp. 174, with 5 illustrations. Chicago: American Medical Association, 1939.

The Sections on Dermatology and Syphilology both of the American Medical Association and of the American Dermatological Association have recently conducted symposiums on industrial dermatoses. This pamphlet is a convenient and valuable collection under one cover of all the papers presented, together with discussions. The symposiums were organized in such fashion as to permit orderly and logical presentation of most of the important aspects of this troublesome subject. There is remarkably little duplication of material as between the presentations in these two meetings. Under this arrangement, attention is successively directed to the need for professional education in occupational cutaneous problems, to their incidence both in comparison to all cutaneous diseases and to compensable occupational diseases, to criteria for diagnosis which ought to be particularly helpful to specialists and general practitioners alike, and to practical prevention. Several papers are devoted to the relation of occupational dermatoses to workmen's compensation principles and procedure, both as general discussions and as specific problems in certain of the individual states. Separate studies concern erysipeloid, chronic granuloma and melanosis due to photosensitization as industrial problems, and there is also a timely discussion of the hazards associated with the manufacture of war gas. This collection succeeds in establishing the fundamental methods of attacking a rapidly growing and exceedingly complex medical problem. The professional status of the participants in the symposiums leaves no doubt as to the authenticity and value of their contributions.

Semeiologia del midollo osseo: Studio di morfologia clinica. Di Aminta Fieschi. Prefazione di Adolfo Ferrata. VI, Biblioteca "Haematologica." Diretta da Adolfo Ferrata. Paper. Price, 70 lire. Pp. 354, with 121 illustrations. Pavia: Tipografia già Cooperativa, 1938.

In the past six years many monographs dealing with sternal puncture have been published, but in no case has the reproduction of marrow cells equaled the excellent illustrations of Fieschi's book. This point is justly emphasized in the preface by Aldolfo Ferrata, the maestro of Italian hematology. The sixteen chapters cover a study of bone marrows from every type of blood dyscrasia and even include a discussion of the morphology of metastatic tumor cells. The author has attempted to carry the study of myelograms beyond the realm of percentages obtained by making differential counts and has emphasized the functional state of the marrow. He points out that there are three forces which regulate the composition of the marrow: a proliferative force, an evolutive or maturative force, and a migratory force which regulates the passage of cells into the blood stream. In order to study the proliferative force the author has made an extensive study of the frequency with which mitotic figures, aberrations and degenerations during the karyokinetic process appear. It is interesting to note that in pernicious anemia megaloblasts show a tendency toward multipolar mitoses. In hemoglobin-bearing megaloblasts, mitotic figures are not so numerous and they tend to be of a degenerative type. To study the evolutive force, Fieschi has devised a curve of maturation for the nucleated red cells and neutrophilic myelocytes which considers the numerical relations existing between the elements of the same category. The author has little faith in the leuko-erythroblastic ratio and believes that it is much more important to observe abnormal cells and those elements which are normally present in small numbers. Like most European hematologists, Fieschi has not been influenced by Doan, Cunningham and Sabin's theory of erythropoiesis and consequently describes megaloblasts in all phases of maturation as being the dominant characteristic in pernicious anemia (contra Peabody). He also recognizes that the neutrophilic series has an abnormal maturation in this disease. The difficulties encountered when one tries to distinguish between marrows from cases of chronic infection and toxic conditions and those of leukemia are discussed. The former can generally be identified by the presence of toxic granulation and increase in plasma cells, endothelial macrophages and histiocytes of various types. Sternal puncture in lymphatic leukemia has a greater diagnostic importance than in myelogenous leukemia. Typical cases will show 50 per cent or more lymphocytes in the marrow. But there are some cases in which the marrow does not show any leukemic change at all. This monograph contains many new ideas concerning the interpretation of bone marrow pictures. Some of the methods of study, especially those of mitotic figures, are too time consuming and detailed to be of practical value. But they, as well as the entire book, are recommended to all hematologists interested in the fundamentals of marrow morphology and function.

Experimental Pharmacology and Materia Medica. By Dennis E. Jackson, Ph.D., M.D., F.I.C.A., Professor of Pharmacology, Materia Medica and Therapeutics in the University of Cincinnati College of Medicine, Cincinnati. Second edition. Cloth. Price, $10. Pp. 906, with 892 illustrations. St. Louis: C. V. Mosby Company, 1939.

This well known and much quoted work is a source book for experimentalists. The present edition, twice as voluminous as the first, is comprehensive in experimental methods, technic and subject matter. Directions are given in detail but they are not prolix. Detail makes the difference between success and failure in an experiment. Michelangelo said "Trifles make perfection, but perfection is no trifle." Jackson has followed the gleam of Michelangelo and has shown an enormous capacity for taking pains.

The unit of procedure is the experiment. The aim is to develop a knowledge and appreciation of general pharmacologic reactions. Since there are about 400,000 known organic preparations and about as many inorganic preparations, he has used the economic principle of grouping drugs according to systemic effects. The groupings include drugs acting on the (1) central nervous system, (2) heart and circulation, (3) respiration, (4) alimentary tract, (5) kidneys and (6) involuntary nervous system. The author well recognizes that no strictly scientific or logical presentation or arrangement of such a vast number of heterogeneous substances is yet possible. He has, however, made progress in this direction.

Pharmacology is the most prominent liaison subject in medicine. Anatomists, biochemists, surgeons, internists, obstetricians, students of nutrition and practitioners of the other specialties are interested intensely in problems that involve pharmacology. The book should be of interest to each of them. It furnishes a method of procedure for almost all branches.

It is impossible to summarize or evaluate the 217 animal experiments, to which the author has devoted 700 pages. Suffice it to say that if one desires to learn how to proceed in almost any field of experimental pharmacology one is likely to find it described. To guide in the work there are twenty-nine color plates on dissection and technic, and twenty-six color plates of drugs. In addition there are numerous illustrations and records to show and explain results. New drugs such as sulfanilamide, sulfapyridine, prostigmine and metrazol are included.

The experiments are arranged for economy both of animals and of time, and for comparing and showing differences in action of drugs; for example, experiment v is devised to show the action of ether, chloroform, epinephrine, acetylcholine, bromide and barium chloride on blood pressure, on respiration, on stomach contractions and on the pupil; experiment CLXXII to show the action of digoxin, digitoxin, thevatin and strophanthin on blood pressure, respiration, diuresis, spleen volume and leg volume; experiment CXV to show the action of lobeline, cyanide, sodium sulfide and carbon dioxide on the carotid sinus, intercarotid body, aortic nerve, aortic body, blood pressure and respiration. These and many similarly arranged experiments emphasize both the pharmacology and the physiology involved in the actions.

Included in this edition is a new section on materia medica and prescription writing. A feature is the color plates of many plants, such as pilocarpus, digitalis and ergot, which yield important and useful drugs. Solubility tables, a list of words and abbreviations, a Latin-English vocabulary and an adequate index complete the volume, a work that demanded an enormous amount of laboratory work, supreme patience and perserverance. The workmanship of the book is excellent. The illustrations, descriptions and directions are definite and clear. This book will retain its place as a classic in experimental pharmacology.

The Surgery of Injury and Plastic Repair. By Samuel Fomon, Ph.D., M.D. Cloth. Price, $15. Pp. 1409, with 925 illustrations. Baltimore: William Wood & Company, 1939.

This large book, which represents an immense amount of research, is an ambitious attempt to encompass within one volume the entire literature of traumatic surgery. The author admits falling short of the mark, as the special surgery of the neck, trunk and extremities was withheld for a future volume to supplement the present one, which deals with the structures of the exterior head. However, since almost half of the book is taken up with fundamental principles of surgical repair, it is quite evident that the most important part of the work is herein offered in complete form. The author has thoroughly analyzed the literature and presented every recognized point of view with regard to manifold aspects of traumatic surgery in general and presents them without bias so that the reader can judge for himself. The general preoperative and postoperative care of the patient, choice of anesthetics, methods of administering them, details of operating room procedure, care of shock, acid base balance and many other factors are presented thoroughly and to the last detail. Much space is devoted to the most elementary details, such as the incision, proper excision of tissue, rearrangement for suturing, types of sutures and suture material, wound dressings, tissue transplants and grafts, so that one need hardly look further for information to cover any imaginable situation. Certainly the profusion of illustrations, line and wash drawings, some with color, are in themselves a liberal education. The author evidently had in mind the average general practitioner, who usually sees the injured person first and whose initial treatment may have a great bearing on the ultimate result obtained. Yet even the experienced surgeon or the specialist in regional plastic surgery into whose hands these cases come later for the correction of traumatic defects will find much that is useful and clarifying in the abundant text. The special chapters on plastic surgery of the nose, eyelids, jaws and face, which include a considerable number of cosmetic procedures, follow the customary practice of the day and are presented simply, so that even the novice may grasp their frequently complex details. A voluminous bibliography follows each important chapter and should prove of utmost value to the student and research worker. This work of Dr. Fomon's must be seen to be appreciated, since it holds the answer to a vast number of questions that are frequently unanswered in books on general surgery. In this day and age of high speed, increasing trauma and a public that is plastic conscious, it behooves every surgeon and general practitioner to familiarize himself with the latest developments in these fields. Fomon's book should fill that need.

Epidemischer und sporadischer Ikterus: Eine statistisch-epidemiologische und klinische Untersuchung. Von Per Selander. Acta paediatrica, Vol. XXIII. Supplementum IV. Paper. Pp. 251, with 16 illustrations. Uppsala: Appelbergs Boktryckeriaktiebolag, 1939.

This monograph by Selander concerns the clinical and statistical study of epidemic and sporadic icterus. In reviewing the literature the author notes that the infective agent of icterus is unknown and that there are differences of opinion as to whether there are two distinct types of the disease or whether there is only one manifesting itself sporadically or in epidemics. In an attempt to clarify the issue the author studied 1,200 cases and reports as follows:

1. As far as onset is concerned, no difference between the two forms could be determined, although sporadic icterus occurred often in the age bracket between 2 and 7 years, while the epidemic form was more frequently seen in the 7 to 15 year group. Sex seems to have no influence on the incidence of either type of icterus.

2. In an epidemic in Gotland the reported incidence among younger patients was greater in the cities than in the country, while in the older group of children the opposite was the case. The author is unable to explain this phenomenon.

3. In both forms of the disease a time factor was evident. June and July saw a minimum and October and November a maximum of cases. This parallels the general incidence trend of contact infections as opposed to diseases, such as typhus and dysentery, which manifest themselves in alimentary disturbances.

4. The incubation time has been generally believed to average from two to four weeks in epidemic icterus. However, in examining patients convalescing from various ailments readmitted to the hospital because of icterus, the author found an average period of from two to three months between the initial discharge and the readmission. Most of the icterus patients had been in the hospital previously. These observations indicate a longer incubation period than is known to exist for any other acute disease, and because an epidemic could hardly flare up when the incubation period is so long there must be a form of the disease which does develop rapidly; therefore the author concludes that epidemic and sporadic icterus are separate entities, although he recommends further investigation to verify this opinion.

5. As far as symptoms are concerned, sporadic and epidemic icterus appear alike. A difference in symptoms was noted, however, between age groups. In adults the onset is more gradual and the hyperbilirubin anemia reaches a maximum more slowly than in children: at the same time the icterus becomes increasingly severe according to the increasing age of the patient, it lasts longer in older persons and convalescence is slower. The sedimentation rate in children increases from the first to the second week and falls somewhat in the third. In adults the rate is higher in the second week than in the first and is still higher in the third.

6. A high icterus frequency was noted in persons with diabetes.

7. Cases of syphilis and acute yellow atrophy of the liver were also observed in the series, but the connection if any between these conditions remains unexplained.

Der Rheumatismus: Sammlung von Einzeldarstellungen aus dem Gesamtgebiet der Rheumaerkrankungen. Herausgegeben von Professor Dr. Rudolf Jürgens, Stellv. Direktor der Universitätsklinik für natürliche Heil- und Lebensweisen und Chefarzt des Augusta-Hospitals Berlin. Band XVI: Die Ischias. Von Dr. med. Hans-Georg Scholtz, dirigierender Arzt der Abteilung für Physikalische Therapie am Städt. Rudolf-Virchow-Krankenhaus Berlin. Paper. Price, 4.87 marks. Pp. 111, with 24 illustrations. Dresden & Leipzig: Theodor Steinkopff, 1939.

This monograph deals with pathology, anatomy, symptoms and therapy of "sciatica." The methods of treatment discussed include diet, antineuralgic medicines, homeopathic medicines, injections, baths, heat, contrast applications, hydrotherapy, galvanic and faradic stimulation, diathermy, roentgen therapy, radium therapy, massage, gymnastics, perineural injections, mud baths, sand baths, hyperthermia and manipulation.

A Guide to Workmen's Compensation: The Law and Its Practice in New York State. By H. D. Margulies and Max Bloom. Paper. Price, 50 cents. Pp. 96. New York: Progress Books, 1939.

On the basis of court decisions and the publications of the Labor Department of New York, the authors, both of whom are members of the New York bar, have attempted in this small paper-back booklet a comprehensive statement of the New York workmen's compensation act in popular, simple terms for the guidance of the worker, his trade union, his representative or attorney and his physician. Appended are sixteen selected rules for physicians promulgated by the state industrial commission.

Die Funktion der Nebennierenrinde. Von F. Verzár, Professor der Physiologie an der Universität Basel. Cloth. Price, 25 Swiss francs. Pp. 266, with 16 illustrations. Basel: Benno Schwabe & Co. Verlag, 1939.

This monograph contains thirty-one pages of references, which number well over a thousand. As might be expected from such a bibliography, the literature has been well reviewed. The author is to be commended for his division and organization of the material, which can best be illustrated by mentioning the chapter headings. The first forty-eight pages is devoted to the physiologic anatomy, the physiology, the preparation and the standardization of the adrenal extracts. Those compounds from the adrenal cortex isolated in crystalline form at the time of writing are discussed. The effects of the adrenal on the organism as a whole are then taken up in chapters on asthenia, carbohydrate metabolism, fat metabolism, protein metabolism, vitamins B and C, sodium metabolism, potassium metabolism, theory of cortical action, circulation after adrenalectomy, respiration after adrenalectomy, heat regulation, hypertrophy and atrophy of the adrenals, the relation between the adrenals and the other glands of internal secretion, and the relation between the adrenals and the sex glands. The final twenty pages is devoted to clinical considerations. It is obvious that the book is more valuable to the physiologist than to the physician. The author's contribu-

tion to the field has been largely in the field of absorption after adrenalectomy. He believes that cortical hormone is necessary for the absorption of fat and has published several papers in support of his views. Other investigators have been unable to repeat his experiments when the animals are kept in better condition by sodium chloride administration and have used fats less irritating to the gastrointestinal tract. It seems that more work is necessary to establish the role of the adrenals in absorption.

La fragilité osseuse congénitale (maladie de Durante). Par H. Pulconis. Préface du Professeur Laffont. Paper. Price, 28 francs. Pp. 134, with 14 illustrations. Paris: Masson & Cie, 1939.

This book on congenital fragility of bones, or osteogenesis imperfecta, is an instructive monograph on what the author calls Durante's disease. The subject is covered from various angles including the clinical and biologic. The author discusses the skeleton of the newborn, various clinical forms and the relationship of the glands of internal secretion. Evolution of the lesion is described and therapeutic deductions are given. There is a large bibliography. The monograph will interest special workers in this field.

Bureau of Legal Medicine and Legislation

MEDICOLEGAL ABSTRACTS

Medical Liens: Lien Effective Despite Compromise of Accident Case.—One of the plaintiffs was a physician who owned a hospital in Prescott, Ark. The other plaintiff was a registered nurse in the hospital. In November 1935 an employee of the defendant lumber company was severely injured in an automobile accident and was brought to the physician's hospital for treatment. The lumber company from time to time paid the medical, hospital and nursing bills until in December, when the employee filed suit against the company for damages, claiming that it had furnished him a car with defective brakes. The company then notified the physician that it would not assume financial responsibility for further services rendered the employee. Thereafter the physician and the nurse filed claims of lien under an Arkansas law which provides that a practitioner, hospital or nurse shall, on compliance with the provisions of the act, have a lien for the value of service rendered a patient for the relief or cure of an injury suffered through the fault or neglect of another, on any claim, right of action, and money to which the patient is entitled because of that injury. The law further provides that a tort feasor who after being notified of a claim of lien pays to the injured patient anything of value as a settlement or compromise shall be liable to the lienors in an amount not in excess of the amount to which the patient was entitled from the tort feasor.

After the claims for liens were filed, and while the suit by the employee against the lumber company was still pending, the company settled with the employee for $4,000 without paying the claims of the physician and the nurse. Immediately on learning of the settlement and of the dismissal of the damage suit, the lienors applied to the court for an order to set aside the dismissal of the damage suit and for judgments against the company for the amounts of their claims. The trial court set aside its order of dismissal and set the case for trial. The burden of proving that the company was liable to the employee for the injuries he received was imposed on the physician and nurse, and the trial resulted in a directed verdict for the company, the court holding that the employee assumed the risk of driving the truck with defective brakes and that, since he could not have recovered from the lumber company because of that fact, the physician and nurse were without recourse against the company. The physician and nurse then appealed to the Supreme Court of Arkansas.

The company defended on the ground that it was not a tort feasor within the meaning of the lien act, since the trial court had held that it was not liable to the employee. If the lumber company was a tort feasor, said the Supreme Court, then the company clearly violated the provisions of the lien act because it was undisputed that it paid the employee $4,000 in settlement of his claim against it without having previously paid to the plaintiffs the amounts of their claims. In the opinion of the Supreme Court, the trial court misconstrued the lien act when it required the plaintiffs to assume the burden of proving a case of liability on the part of the company to the employee after a settlement had been made. If no settlement had been made and if the case had been brought to trial, then the burden of making a case would have been on the employee and if he had failed the liens of the plaintiffs would have failed also. But by compromising and paying $4,000 to the employee, the company admitted in effect that it was in the wrong, was a tort feasor, even though it took a release from the employee absolving it from blame.

It may be, the court said, that the employee was not legally entitled to the $4,000 paid him, but the lumber company cannot be heard to say that he was not, because it voluntarily paid it to him in compromise of a claim of $85,000. The lien act was enacted for the very humane purpose of encouraging physicians, hospitals and nurses to extend their services and facilities to indigent persons who suffer personal injuries through the negligence of another by providing the best security available to assure compensation for services and facilities. As the court viewed the act, it places no burden on industry nor does it tend to discourage settlements. The alleged tort feasor may defend the action in the courts. If there is no liability on the part of the alleged tort feasor, the lien claimant loses his claim for services. If the case is compromised, all the tort feasor has to do is either to pay the lien claimant or get a written release of the lien claim from him.

The Supreme Court, therefore, reversed the judgment of the trial court and remanded the cause with direction to establish and enforce the lien of the plaintiffs for the amounts of their respective claims.—*Buchanan et al. v. Beirne Lumber Co. (Ark.), 124 S. W. (2d) 813.*

Undertakers: Solicitation of Dead Bodies as Cause for Suspension of License.—The California funeral directors' and embalmers' law authorizes the board of examiners to revoke or suspend the license of a licensee who engages in the solicitation of dead human bodies, whether such solicitation occurs after death or while death is impending. Under a complaint charging a violation of this provision, the board suspended the embalmer's licenses of Drummey and Wilson and the funeral director's license of the latter. The superior court, city and county of San Francisco, issued a writ of mandate commanding the board to restore the licenses so suspended, and the case came before the Supreme Court of California for review.

The court could find nothing arbitrary or discriminatory in the provisions of the law prohibiting the direct solicitation of dead human bodies after death or while death is impending. The provision appeared to the court to be a reasonable regulation bearing a definite relation to the public health. It obviously was aimed at preventing the commercialization of death at a time when those concerned are emotionally upset and easily imposed on. The licensees further contended that the act was unconstitutional because it failed to provide for a proper notice of hearing. The act, observed the court, provides that the power to revoke or suspend a license shall be exercised "after proper hearing and notice to the licensee." It was urged, however, that the act was unconstitutional because it did not specify the form, manner, extent or duration of notice. Due process does not require, the court pointed out, any particular form of notice or method of procedure. If an act provides for reasonable notice and a reasonable opportunity to be heard, that is all that is required.

The board, in attacking the judgment of the trial court, contended that the writ of mandate is not available to a person who has been improperly deprived of a license by an administrative board to secure the restoration of that license. With this contention the Supreme Court could not agree. It has been held, the court said, that certiorari is not the proper remedy, since such boards do not and cannot exercise judicial powers, the theory being that, if the legislature attempted to confer judicial or quasi-judicial powers on statewide administrative boards, the statute would violate the California constitution, which vests the entire judicial power of the state in the courts, with certain

enumerated exceptions. The writ of prohibition likewise cannot be used to restrain administrative boards from taking action, for the reason that the office of the writ of prohibition is limited by the California constitution to the restraint of a threatened exercise of judicial power in excess of jurisdiction. In the absence of a proper statutory method of review, mandate is the only possible remedy available to those aggrieved by administrative rulings of the nature here involved. Furthermore, the court continued, since the administrative board did not exercise judicial or quasi-judicial functions, its findings based on conflicting testimony are not binding on the courts. If in the present case it should be held that the board's action in cancelling or suspending an existing license is binding on the courts, if such action is predicated on conflicting evidence, it would necessarily follow that the board exercised at least quasi-judicial powers, it being the essence of judicial action that finality is given to findings based on conflicting evidence. In addition, if an administrative board deprives a person of an existing valuable privilege without the opportunity of having the finality of such action passed on by a court of law, the due process clause of the federal constitution would probably be violated. The trial court, having power to weigh the evidence, must be conclusively presumed to have performed its duty, and its determination of the facts, based on conflicting evidence, is binding on appeal. The judgment directing the issue of the writ of mandate was therefore affirmed.—*Drummey v. State Board of Funeral Directors and Embalmers (Calif.), 87 P. (2d) 848.*

Workmen's Compensation Acts: Silicosis an Accidental Injury, Not an Occupational Disease.—The claimant worked for the defendant lead company in its lode mine from August 1931 to April 1936, during which period he contracted silicosis for which the industrial accident board denied him compensation. He then appealed to the Supreme Court of Idaho.

One of the several issues before the court was whether or not the claimant's disability was due to an occupational disease for which no compensation was payable under the workmen's compensation act of Idaho. The evidence showed without material dispute that the rock in the mine in which the employee worked had a high silica content, that it was hard and that of the twenty-nine drills used only nine were wet drills. The wet drills were used only intermittently when the state mine inspector made his visits; when properly used the wet drills did away with the extremely dusty condition which otherwise prevailed. The result of the use of dry drills instead of the wet drills, the inadequacy of the ventilation system, the resultant exposure of the miners to silicosis and the forced condition of employment (the testimony being that when the miners complained of these conditions they were told that if they didn't like it they could quit) were all known to the lead company, the court pointed out. In addition, the company knew through its managing employees that the claimant, during his period of employment, lost weight and appetite and became short of breath and afflicted with a cough, all well known symptoms of silicosis. The authorities, the court pointed out, all agree that silicosis is in large part preventable by one device or another. The evidence in this case conclusively showed that the company, by its own experience, in its own mine, knew that by the use of wet drills the hazard could have been done away with, or at least greatly lessened. Under such circumstances the court did not believe that the claimant suffered an occupational disease within the meaning of the workmen's compensation act because an occupational disease, as viewed by the court, is one which inheres in the particular employment and cannot by reasonable means be prevented. Furthermore, the court said, the accident for which compensation is payable under the act need not occur at one instant, but there may be repetitious causes, all relatively slight, which culminate and result in as serious an injury and as frequently fatal as though the disabling or lethal blow or incident occurred at one time.

While compensation does not depend, the court pointed out, on the negligence of the employer, such negligence not only does not preclude compensation but compels it. The order of the board denying compensation to the claimant was therefore reversed and the cause remanded with instruction to award compensation.—*Brown v. St. Joseph Lead Co. (Idaho), 87 P. (2d) 1000.*

Society Proceedings

COMING MEETINGS

American Association of Anatomists, Louisville, Ky., Mar. 20-22. Dr. E. R. Clark, Dept. of Anatomy, Univ. of Pennsylvania School of Medicine, Philadelphia, Secretary.

American Association of Pathologists and Bacteriologists, Pittsburgh, Mar. 21-22. Dr. Howard T. Karsner, 2085 Adelbert Rd., Cleveland, Secretary.

American College of Physicians, Cleveland, Apr. 1-5. Mr. E. R. Loveland, 4200 Pine St., Philadelphia, Executive Secretary.

American Orthopsychiatric Association, Boston, Feb. 22-24. Dr. Norvelle C. La Mar, 149 East 73d St., New York, Secretary.

American Physiological Society, New Orleans, March 13-16. Dr. Philip Bard, Johns Hopkins Medical School, Baltimore, Secretary.

American Society for Experimental Pathology, New Orleans, March 13-16. Dr. Paul R. Cannon, Dept. of Pathology, University of Chicago, Chicago, Secretary.

American Society for Pharmacology and Experimental Therapeutics, New Orleans, March 13-16. Dr. G. Philip Grabfield, 319 Longwood Ave., Boston, Secretary.

Federation of American Societies for Experimental Biology, New Orleans, Mar. 13-16. Dr. D. R. Hooker, 19 West Chase St., Baltimore, Secretary.

Northern Tri-State Medical Association, Battle Creek, Mich., Apr. 9. Dr. E. Benjamin Gillette, 320 Michigan St., Toledo, Ohio, Secretary.

Pacific Coast Surgical Association, Portland, Ore., Apr. 3-6. Dr. H. Glen Bell, University of California Hospital, San Francisco, Secretary.

Tennessee State Medical Association, Chattanooga, Apr. 9-11. Dr. H. H. Shoulders, 706 Church St., Nashville, Secretary.

CENTRAL SOCIETY FOR CLINICAL RESEARCH

Twelfth Annual Meeting, Held in Chicago, Nov. 3 and 4, 1939

(Continued from page 522)

Heart Sounds Recorded Simultaneously with the Electrocardiogram

DRS. CLAYTON J. LUNDY and JOHN POST, Chicago: There is definite clinical value in obtaining tangible heart sound records. In 143 instances third heart sounds were recorded when they were not detected clinically. They were loudest in the presence of mitral stenosis and regurgitation with cardiac enlargement. No classification of recorded systolic murmurs was possible on the basis of the degree of heart involvement. No constant relationship was demonstrated between the type of recorded systolic murmur and severity or type of heart involvement.

A much needed dependable method of elucidation of diastolic murmurs is made available. In certain instances the loud diastolic murmur of aortic regurgitation masked the presystolic murmur of mitral stenosis on clinical examination, whereas the stethograph revealed the true facts in spite of marked tachycardia. The utility of this unprejudiced method is demonstrated further by the recording of a low pitched middiastolic murmur, which in this series of cases was not detected clinically in ten instances.

In fifty-three instances of stethographic mitral systolic murmurs, in nineteen with and in thirty-four without cardiac enlargement, there was no evidence of stenosis. In twenty-nine of these cases there were low amplitude, mixed diastolic sounds with and without clicks which could not be differentiated from breath sounds or room noise; in seven there were low amplitude and frequency sounds which diminished as middiastole was reached and increased as the succeeding first heart sound was reached; these were probably inaudible clinically and their significance remains to be explained. In twelve cases there was no reason; in five low frequency and low amplitude middiastolic murmurs occurred. Of seventy-three cases of clinical mitral stenosis and regurgitation, in forty the diagnosis was confirmed stethographically. In fourteen the condition was diagnosed on data other than a systolic murmur; in five there was a thrill without a presystolic murmur heard clinically and in nine there were short presystolic murmurs which were considered stethographically to be slapping first sounds and not true presystolic murmurs. In five cases diastolic murmurs were attributed to breath sounds and in four cases no reason could be ascribed.

A slapping first heart sound was recorded in nine instances in which the clinical diagnosis of presystolic murmur was unproved. A slapping second sound was recorded twenty-one times, in sixteen instances in the pulmonic area; this is the delayed snap (usually of the mitral valve) and was reported clinically only once.

DISCUSSION

DR. LOUIS KATZ, Chicago: The implication of the authors that an instrument for recording heart sounds is better than the clinician's ear in determining whether a murmur is present or absent is not a sound point of view. It must be determined that the heart sound recorder has the proper physical properties for adequately recording the vibrations in a manner similar to that which the average ear picks up. Most instruments exaggerate vibrations of low frequency with which they resonate, and they may not pick up the high vibration frequencies. Instrumental analysis should not replace clinical use of the special senses. These instruments perform a useful function in educating the ear but should not necessarily be used as the final court of authority. No instrument is as good as the ear of the properly trained clinician with good hearing. This is not to be interpreted as denying that clinicians vary in their experience and that some are actually tone deaf for certain sound ranges, nor does this statement deny that certain vibrations below the audible range can be recorded by such instruments in mitral stenosis. The aim in clinical practice should be to encourage and not to discourage the clinician to use his ears. This brings up the point that a sharp distinction should be made between those instruments which tend to record what the clinician can measure with his own senses and those instruments which give information not ostensibly obtainable by ordinary clinical means. The use of the latter should be encouraged; the former may not be needed for the ordinary clinical examination, however useful in research.

DR. EDWARD W. HOLLINGSWORTH, Hines, Ill.: I wonder what the authors mean by the term "unbiased." I do not believe they mean that the clinician is biased and it may refer to the fact that one obtains a mechanical graph of the sound. That depends on the accuracy of the instrument. I have used a home made instrument and am confused because the sounds are not duplicated. I think from a view of the authors' tracings that their machine acts similarly sometimes. The outstanding thing in such sound graphs is murmur and I am not sure but that a stethograph may be accurate; yet I think all such instruments are susceptible of further development and that the ear has to check the instrument and vice versa. The study of quality and timing of sounds may offer more information than the study of the murmur. This is a study which we should appreciate; it offers wide field for further work.

DR. M. J. SHAPIRO, Minneapolis: I should like to ask the authors what they mean by mitral regurgitation without cardiac enlargement. It was my impression that patients who had rheumatic fever but who did not show either cardiac enlargement or change in contour were recognized as having "potential heart disease" even though they had apical systolic murmurs. This may seem only of academic interest but for those who are carrying on a long time study in rheumatic heart disease it is necessary to be extremely careful in making the correct diagnosis in order to keep our records clear. I do not know how one makes a diagnosis of mitral regurgitation without evidence of cardiac enlargement or change in contour or both.

DR. FRANKLIN D. JOHNSTON, Ann Arbor, Mich.: This paper is timely and is indicative of the great interest relative to the graphic registration of heart sounds. Such records afford an objective check on impressions gained by auscultation, and evidence of this sort is rare in clinical medicine. I agree with Dr. Katz that care should be used in their interpretation, since the type of record that is obtained depends to a large extent on the nature of the recording system that is employed. I do not agree with Dr. Katz that the ear is always better than the graphic record. Low pitched sounds like auricular sounds or third heart sounds may be difficult for some individuals to hear and yet may be recorded without difficulty. I think that sound tracings are of great value for teaching purposes and that occasionally they are of some diagnostic worth. Concerning systolic murmurs, Dr. Bert Boone, of the United States Public Health Service, has taken sound tracings on a large group of normal children and in quite a few instances has found vibrations in systole while on careful examination no systolic murmur could be heard. I have had similar experiences occasionally, and I do not know exactly how to explain them. These vibrations are probably of no clinical significance.

DR. CLAYTON J. LUNDY, Chicago: Demonstration of murmurs in the past has been unsatisfactory, and I believe I am justified in saying that the stethograph is here to stay. Criteria will be based on the records that are unbiased except in the technical sense indicated by Dr. Katz. Imperfections will be worked out. I believe this also answers Dr. Hollingsworth. Dr. Shapiro is undoubtedly correct about the heart association classification, but I must call attention to the insurance reports of a higher mortality rate among persons with a systolic murmur only. With that classification no consideration is given to the fact that it takes time for enlargement to take place and that the organic murmur must necessarily precede the accomplished fact of cardiac enlargement.

Effect of Distention of Abdominal Viscera on Blood Flow in Left Circumflex Coronary Artery

DRS. N. C. GILBERT, G. V. LEROY and G. K. FENN, Chicago: The opinions of physiologists differ about the nature and significance of viscerocardiac reflexes. That modifications in cardiac rhythm occur after visceral irritation is accepted and it is generally believed that such variations are instigated by the vagus nerve. The presence of coronary artery vasoconstrictor fibers in the vagus is not generally accepted. However, we have seen many suggestive clinical instances in which relief or prevention of abdominal distention has mitigated cardiac pain and nocturnal dyspnea.

Acute experiments were performed on thirteen dogs on whose left circumflex coronary artery a thermostromuhr of the "direct current heater" type had been installed. Subsequently the chest was closed; observations of the blood flow in that artery and of the blood pressure and pulse in a femoral artery were made. The stomachs of these animals were distended, by means of moderate air pressure in a balloon introduced through the esophagus. Distention of the abdomen was obtained by inflating the peritoneal cavity through a trocar. Some of the dogs were later atropinized and vagotomized and the experiments were repeated. The results were as follows: Distention of the stomach caused significantly decreased blood flow in the left circumflex coronary artery eleven times and increases in blood flow two times. In these experiments the blood pressure increased more often than it fell, and pulse rate changes were variable; usually a slight decrease was noted. After atropinization and/or vagotomy, the blood flow in the coronary artery increased two times, was unchanged three times and decreased once when the stomach was distended. Distention of the peritoneal cavity resulted in increased blood flow two times and decreased blood flow four times. After atropine was given, the blood flow increased with each distention. We feel that these experiments demonstrate a reflex vasoconstriction of the coronary arteries resulting from stimulation by distention of the stomach or of the abdomen generally. Similar experiments in chronically affected animals, without anesthesia, are in progress.

DISCUSSION

DR. FRED SMITH, Iowa City: The experimental observations of Dr. Gilbert and his associates pertain to an important subject. The association of gastric symptoms with anginal pain is well known, but the explanation, while suspected, has not been heretofore conclusively demonstrated. Patients presenting this picture commonly state that they are able to obtain relief by eructation of gas. I have a patient who is able to walk a considerable distance without discomfort if she takes her time. However, the least bit of effort following a meal brings on anginal pain. Moreover, the pain may come on at this time while she is at rest, and the eructation of gas gives prompt relief. This would indicate that this patient has an increase in the gastric tension which is probably associated with pylorospasm. The following points in the study just reported appear to be significant: First, the conspicuous reduction in coronary circulation in the presence of elevation of the blood pressure is important because the level of the blood pressure is the most significant single factor in maintaining the rate of the coronary flow. Second, the reported influence on the coronary circulation may be reproduced repeatedly. Finally, the effects may be abolished by the administration of atropine. These facts in my opinion justify the conclusions of the authors.

DR. LOUIS KATZ, Chicago: The authors have demonstrated that distention of the stomach and duodenum can lead to a decrease in coronary flow in the dog. It is probable that this may also occur in man, although this is not necessarily the

case. For example, it is known that epinephrine increases the coronary flow and dilates the coronary vessels in animals, and yet in man, apparently despite such an action, angina pectoris may result. Further, it does not follow that the decrease in coronary flow reported by the authors is due to coronary vasoconstriction. Other factors besides this influence coronary flow, and it is well known that reflexes will cause irregular heart action, usually in the form of extrasystoles, which can cause a decreased coronary flow. Experiments such as these cannot be taken to indicate that a reflex coronary constriction occurs by way of the vagi. Even if a coronary constriction does occur, which has not been demonstrated in these experiments, the constriction must be through the sympathetic nerves, which we have found in our laboratory are the only ones that carry coronary vasoconstrictor fibers. In the vagi only coronary vasodilator fibers were demonstrated by us, and these were of the so-called cholinergic variety, the action of which could be abolished by atropine. In short, care must be taken in interpreting changes in coronary flow as indicative of active changes in coronary caliber.

DR. W. W. HAMBURGER, Chicago: The authors of this paper no doubt know of the work of Dr. W. J. Kerr, of San Francisco, who believes that a supporting abdominal belt will prevent episodes of pain in certain patients with lax abdomens who are suffering with angina pectoris. It seems to me that Dr. Kerr's view conflicts with the conclusions reached in this report. I should like to ask how Dr. Gilbert and his associates reconcile their work with his. As a clinician, I find myself confused on whether to advise such a patient to loosen his vest or to wear a supporting belt.

DR. G. V. LEROY, Chicago: In answer to Dr. Hamburger's question: We have wondered about the same thing ourselves. We feel that we have discharged our duty on this occasion by elucidating one mechanism and that only confusion would result if we attempted to explain every divergence that may occur. In answer to Dr. Katz, there are so many differing results reported by workers in cardiac physiology that it would be foolish to try to explain another worker's conclusions which differ so radically from our own.

The Heart in Diabetes

DR. THOMAS ZISKIN, Minneapolis: That heart complications occur in diabetes mellitus is well known. How soon heart involvement occurs and under what conditions have not been definitely proved. A study of the heart was made in a group of ninety-six veterans admitted to the hospital for the treatment of diabetes. Comparisons were made with a control group of patients with conditions other than cardiac. It was deemed significant that 46 per cent of the diabetic group showed abnormal electrocardiographic signs indicative of heart involvement and also that these abnormal signs occurred in a large percentage of the patients in whom the diabetes was first discovered on admission or had existed for one year or less.

DISCUSSION

DR. PAUL S. BARKER, Ann Arbor, Mich.: Dr. Ziskin has pointed out some features in the group which would probably be placed in the so-called adult type of diabetes. In diabetes in older people the cardiac abnormalities are common, and they are usually those of arteriosclerosis. It was of interest that changes were so common among patients whose diabetes was of approximately one year's duration; it would be of interest to reconcile this observation with the one that so many of the patients who have had diabetes for six years or longer did not show changes. The slurring as shown in some cases, I suspect, was so slight as to be of doubtful significance. Left axis deviation if pronounced can be considered definitely abnormal. Extrasystoles need not be taken as evidence of heart disease.

DR. THOMAS ZISKIN, Minneapolis: In this series the extrasystoles, although they are mentioned in the observations, were not considered of any comparative clinical value. The comparisons were made on the increase of slurring of the QRS complex and the other definite features of coronary disease. It is true that some of the slurring is very mild, but the same criterion for slurring of the QRS complex was used in the control group, and the fact that even the mild slurring was not present in the control group would indicate that this sign may be of some significance. This study brings to our attention the fact that these electrocardiographic signs occurring early in the course of diabetes indicate that one must be on the lookout for coronary changes in the heart very early and must direct treatment accordingly.

Exercise Tolerance of Dogs After Coronary Occlusion

DRS. HOWARD BURCHELL and A. R. BARNES, Rochester, Minn.: The exercise tolerance of dogs has been studied after sudden and chronic coronary occlusion. Animals that have recovered from acute myocardial infarction have shown no decrease in ability to exercise. It has also been possible to occlude gradually the three major vessels in the dog's heart without the production of infarction and without demonstrable cardiac disability. Injection studies have shown the numerous potential anastomoses between the coronary vessels and the large anastomotic channels developing after coronary artery constriction and occlusion. Tissue grafts to the heart have not influenced the tolerance of animals for exercise.

DISCUSSION

DR. WARREN B. COOKSEY, Detroit: We have seen today two beautiful pieces of fundamental research in the problem of coronary disease. During the last few years I have had opportunity to see and be with two of my friends who have had severe cardiac infarcts. One does everything I tell him not to do, and he has shown no ill effects. I have been with the other in camp and I have been astounded at his tolerance to properly controlled exertion, though his infarction was extreme. It is, of course, common knowledge to all who see a good deal of coronary occlusion that many patients obtain a high degree of recovery. In spite of these facts and the demonstration we have just seen, one should clearly distinguish between properly controlled exertion and the more unusual or extreme forms of exertion, which can effect physiologic and pathologic changes conducive to thrombus formation. In a significant, though not large, number of cases coronary occlusion actually occurs within a few hours after an acute strain of unusual degree, a fact which must not be confused with Drs. Burchell and Barnes' experiments.

DR. LOUIS KATZ, Chicago: The method used by the authors for studying the exercise tolerance of the dog in coronary occlusion is logical. During the past week I have seen a dog in which a spontaneous infarction of the left ventricle developed, as shown by autopsy. After this the animal had discomfort and severe dyspnea, and an hour before death pulmonary edema could be demonstrated. This experience suggests that the dog, like man, shows evidence of cardiac strain in the manner postulated by the authors.

DR. A. R. BARNES, Rochester, Minn.: It is apropos in connection with this demonstration to recall some valuable work by Oberhelman and Le Count, who were studying the possibilities of demonstrating the connection between the right and left coronary arteries in both normal and diseased hearts. In many cases they found that they could carry the injection of one coronary over into the other side. In other words, those apparently normal persons have a coronary circulation that permits blood to pass from one artery to another. They believed that such a person could stand attacks of coronary thrombosis well. If they selected hearts subjected to chronic coronary disease and gave them injections, a good many would show the injection passing from one artery to the other. They believed that such a patient would probably survive and that the survival would be followed by healing with scar formation. I think the demonstration here, showing that after chronic occlusion it was possible to ligate a coronary artery with a low mortality rate but without much scar and permitting the dog to undergo normal exercise, has a real clinical bearing.

DR. FRED SMITH, Iowa City: The present study is of interest in connection with recent observations by Schlesinger, who demonstrated that even in the presence of multiple occlusion of the coronary arteries it might be possible to make a fairly complete injection of these vessels. Thus the results from the experimental study reported are comparable to what may be found in man. Therefore it would seem that the ability of an individual to withstand coronary artery disease depends on the extent of the collateral circulation and that this has a significant influence on the character and type of clinical manifestations.

DR. EDWIN F. HIRSCH, Chicago: The postmortem examination of patients who have died with coronary diseases demonstrates that the coronary artery lesions are usually in the first portions of the vessels. Beyond the constriction, the vessels are widely patent. Therefore the peripheral portions are able to dilate in the compensatory collateral circulation.

Chemistry of Atherosclerosis: Lipid and Calcium Content of Intima and Media of the Aorta With and Without Atherosclerosis

EDWIN F. HIRSCH, M.D., and SIDNEY WEINHOUSE, PH.D., Chicago: The lipid and calcium contents of media tissues from human aortas increase with age. The increase is not correlated with the degree of intima atherosclerosis. Intima tissues without lesions have larger amounts of lipid and smaller amounts of calcium than the corresponding media tissues.

With increasing severity of the atherosclerotic lesions of the intima the proportions of free and combined cholesterol increase until the onset of necrosis; then the proportion of the combined cholesterol decreases. Also there are increased proportions of ether-insoluble phospholipids and calcium, and decreased proportions of the ether-soluble phosphatides, galactosides and fatty acids. The proportions of the individual lipid constituents in the intima and in the simple fatty deposits of the intima correspond closely with the analysis reported for these substances in blood plasma. These relations imply that the lipid deposits in the intima are the result of nonselective infiltration and precipitation of lipids from the plasma of the blood.

DISCUSSION

DR. EDWIN F. HIRSCH, Chicago: The point of view may be clarified by saying that two factors, the lipid and the tissue, are involved in this study. The earliest deposits of lipid in the aorta occur around the openings of the intercostal vessels and at other special places. Whether it is tissue structure or motion is not known, but something occurs in these places that unstabilizes the lipid material and leads to the separation of the lipid substances. The stability of the dispersed lipid material also may vary.

Relation of Arteriovenous Nicking to Enlargement of the Heart in Ambulatory Patients with Hypertension

DRS. SAMUEL A. SHELBURNE, J. LEEPER HAWLEY and A. S. MCGEE, Dallas, Texas: We were able to show by this study of 320 ambulatory cases of hypertension that arteriovenous nicking is a late sign in this condition and that enlargement of the heart occurs at about the same time arteriovenous nicking appears, with but few exceptions. This clinical rule is so nearly constant that, if the nicking is present and the heart is enlarged, it may be assumed that the enlargement is due to hypertension, even though the blood pressure is not elevated at the time of the examination. On the other hand, if enlargement of the heart is present in a hypertensive person and arteriovenous nicking has not appeared, one may with reasonable certainty assume that there is another cause for enlargement, such as coronary, syphilitic or rheumatic heart disease. Long experience has shown that arteriovenous nicking does not occur except in hypertensive states and that it is the most reliable retinal sign of hypertension.

This study is based on a careful examination, by the senior author, of each branch of the retinal artery of both eyes in these 320 cases of hypertension, and a concomitant teleoroentgenogram, as well as a careful history and physical examination, an electrocardiogram, urinalysis and Kline tests. Of the group of patients that had arteriovenous nicking, enlargement of the heart was present in 97.3 per cent. The exceptions were studied in greater detail. In the group of hypertensive patients who had no nicking (seventy-three cases) there were four (5.4 per cent) who had enlargement, and no cause other than hypertension could be found. Two of these had questionable enlargement, as they had unusual body formations and measurement of the heart size was not reliable. We also studied heart size in relation to early arteriovenous nicking. The results were not as definite as would be expected, but they are of considerable interest. The relation of these arterial changes to glomerulonephritis has also been studied.

DISCUSSION

DR. ROY W. SCOTT, Cleveland: It has been known for many years that retinal arteriosclerosis almost always occurs in vascular disease with hypertension and that therefore an ophthalmoscopic examination affords valuable evidence from both the diagnostic and the prognostic standpoint. Appreciating the very capricious distribution of human arteriosclerosis, I question that one is justified in correlating arteriovenous nicking with cardiac enlargement as closely as Dr. Shelburne has done. The inference is made that all patients who exhibit this nicking have cardiac enlargement demonstrable by x-rays and that one does not encounter cardiac enlargement in hypertensive patients without the nicking. Such close association between heart size and retinal vascular changes is not observed in many cases of essential hypertension.

DR. LOUIS LEITER, Chicago: While the authors have collected fine clinical data, I agree with Dr. Scott that they have not drawn entirely correct conclusions. The authors were surprised to notice 35 per cent of patients with enlarged hearts who had no retinal arteriovenous nicking. It is not surprising if one remembers that, in general, it takes longer for arteriovenous nicking to develop than for cardiac enlargement. Of course if the patient has both features at the first examination it would be difficult to decide which came first without considerable additional information. It is important to attempt to correlate the eyeground changes with changes elsewhere in the body because some of the conclusions drawn from these observations may have a bearing on theories of the etiology of essential hypertension.

DR. SAMUEL A. SHELBURNE, Dallas, Texas: When one attempts to make clinical correlations of varying factors, one is open for criticism. If any one does not believe that when there is arteriovenous nicking there is going to be enlargement of the heart, I will not accept his opinion until he has made as careful a study as we have. It has been asked What is the practical usefulness of this work? If one knows the relation between these changes and the size of the heart, if one knows what this factor of arteriovenous nicking means in terms of enlargement and if my statement is true, then it becomes practical: If a patient has nicking and enlargement of the heart, one knows that the enlargement is due to hypertension, a sound reason for enlargement of the heart. Dr. Leiter says that enlargement of the heart occurs before arteriovenous nicking. We do not know that.

Effects of Intravenous Solutions Given to Patients With and Without Cardiovascular Defects

DRS. FARNCIS D. MURPHY, JOHN GRILL and HOWARD CORRELL, Milwaukee: Our purpose in this investigation was to determine the effect of giving intravenous solutions on the cardiovascular systems of patients with and without heart disease. In determining the capacity of the cardiovascular system to make adjustments for the added fluids, the following routine procedures were employed: In addition to the usual clinical observations the venous pressure, the circulation time, the vital capacity and the blood and plasma volumes were determined. Also hematocrit studies, blood counts, the minute volume of the urine output, hemoglobin determinations and electrocardiographic studies were made. These estimations were done before fluids were administered and repeated every fifteen to thirty minutes for from six to twenty-four hours. The patients were weighed before and after the observations. A total of eighty-three patients were studied. There were fifty-three cardiac patients, of whom twenty-one belonged to grade 3, twenty to grade 2B and twelve to grade 2A according to the classification of the American Heart Association. The fluids used for investigation consisted of isotonic and hypertonic solutions. A comparison between the effects of the larger volumes and of smaller amounts was made. A correlation between the various results of the procedures employed and an interpretation of them in view of the clinical condition of the patient were attempted.

DISCUSSION

DR. WILLIAM S. MIDDLETON, Madison, Wis.: This paper is timely. Many surgeons and urologists have come to believe that they must "hydrate" their patients. It is true that the patient may need fluids under certain circumstances, but when confronted with clinical experiences of the following order one is apt to be more conservative. There is the patient who had an operation

and it was recommended that she receive 500 cc. of 5 per cent dextrose intravenously. By mistake 500 cc. of 50 per cent dextrose was given, and within a half hour's time there developed extreme dyspnea, cyanosis, pulmonary edema and engorgement of the liver. Fortunately the patient survived this harrowing experience. Another patient on whom necropsy was done in our institution had had on the recommendation of a member of the staff 11,150 cc. of fluid in two and a half hours. I do not cite this circumstance in criticism of this confrère alone but to show what can happen if physiologic principles are neglected. It is obvious that crystalloids in solution can be poured into the circulation at a speed at which the patient is unable to care for them. Obviously if one utilizes a 50 per cent solution one brings in ten times the amount of fluid administered. Whenever substances of this kind are given, one should bear in mind the relativity tonicity of the solution used. The hypertonicity of intravenous infusions and the rate of their administration are the important factors in determining cardiac overstrain in this connection. (Colloidal suspensions are not included in this discussion.) In this very concrete problem the internist must consult with the surgeon for the protection of the patient.

DR. ELMER DEGOWIN, Iowa City: I have observed with increasing alarm the practice of giving large amounts of fluids intravenously. This same study can be applied to transfusions of blood as well as to injection of saline solution and dextrose. Years ago Plummer reported six instances of fatal pulmonary edema following blood transfusions in cases of heart disease. We have observed two such instances, one patient having chronic nephritis and the other subacute bacterial endocarditis. Both died within an hour after transfusion. I have seen one other striking case: 800 cc. of dextrose-blood mixture given in the jugular vein to an infant weighing 7½ pounds (3.4 Kg.); in two hours the baby became cyanotic, and in spite of venesection he died within thirty-six hours. At necropsy the heart was dilated, the lungs were congested but not edematous and there was generalized congestion in all tissues.

Pulmonary Edema: Its Roentgenologic Appearance in Acute Glomerulonephritis Without Signs of Cardiac Failure

DRS. THORNTON SCOTT, Lexington, Ky., and RICHARD SCHATZKI and WALTER BAUER, Boston: The roentgenologic picture of pulmonary edema was described and a brief review of the literature was given. Certain features which distinguish it from that of pulmonary stasis in congestive cardiac failure were outlined. Two cases of acute glomerulonephritis with roentgenologic evidence of pulmonary edema were presented in which there was no discernible background of myocardial failure. Two other cases with definite clinical and roentgenologic signs but with less certain pathogenesis were presented for comparison. There was a discussion of recent concepts of the pathogenesis of edema of the lungs. The importance of recognition of the latent or early forms roentgenologically was stressed, that unnecessary treatment may be avoided.

Hypertension and Unilateral Renal Disease

DRS. NELSON W. BARKER and WALTMAN WALTERS, Rochester, Minn.: Four cases were reported of unilateral chronic pyelonephritis with considerable atrophy of the affected kidney but no evidence of disease of the opposite kidney. In each of these cases hypertension had developed after the renal disease was well established. Careful studies of the blood pressure were made before and after nephrectomy, and reexaminations of the patients (sixteen months later in the first case, six months later in the second case, twelve months later in the third case and thirteen months later in the fourth case) showed that the blood pressure had returned to normal after operation and had remained within normal limits.

DISCUSSION

DR. LOUIS LEITER, Chicago: The problem presented by these cases is on the whole relatively simple, in that one is usually dealing with a unilateral renal disease in young people with normal function on the uninvolved side. Secondly, the duration of the hypertension has not been long enough to result in development of organic vascular disease in the other kidney. It seems that the renal pressor mechanism is released more easily in man than in the dog and requires much less kidney tissue to maintain the hypertension. The exact amount of ischemic renal tissue necessary to bring about this reaction, or the quantitative aspect of the balance between the normal and the atrophic kidney, apparently varies from species to species. It should be emphasized that these relatively simple clinical cases are rare. I was pleased to hear that Dr. Barker still thinks there is such a thing as "essential" hypertension. Surgical treatment of patients, particularly in the older age groups, with active or old pyelonephritis in one kidney but with some reduction of function in the other kidney is difficult. I would urge caution in deduction as to the ultimate outcome of the operation unless the patients have been followed for a year or two after operation, especially those over 40. It is possible that in some of them hypertension will redevelop.

DR. NELSON W. BARKER, Rochester, Minn.: As Dr. Leiter indicated, it is probable that the development of hypertension in these cases depends on the amount of destruction of renal tissue. We do not have sufficient evidence to say that any localized renal lesion, no matter how small, may be responsible for the production of hypertension. It is also well to point out that, even if it is the result of unilateral renal disease, hypertension which has existed for a long period may not disappear after nephrectomy, since irreversible organic changes may have developed in the arterioles throughout the body. In a case of hypertension with one badly diseased kidney and one slightly diseased kidney, considerable clinical judgment is necessary to determine whether the bad kidney should be removed. I believe that this should depend on how bad the hypertension is and on how long it has existed. I do not think that age alone is a contraindication to surgical treatment provided the patient is otherwise in good physical condition.

A Simplified Inulin Clearance Test for Measurement of Glomerular Filtration Rate

DRS. BENJAMIN F. MILLER and ALF S. ALVING, Chicago: Our previous experiments have demonstrated that the inulin clearance at low plasma levels is an adequate measure of the glomerular filtration rate in normal, nephritic and hypertensive individuals. On the basis of these results and by employing a sensitive colorimetric method for the determination of inulin (Alving, Rubin and Miller), we have devised a simplified practical procedure whereby the glomerular filtration rate can be determined in the clinic. The measurement of the glomerular filtration rate permits one to make precise estimates of the changes that have occurred in specific functions and anatomic sections of the nephron.

DISCUSSION

DR. NORMAN M. KEITH, Rochester, Minn.: Drs. Alving and Miller have developed a new, accurate micromethod for the estimation of inulin, only a small injection of which is necessary to determine glomerular filtration rate or clearance. Their results in a small number of cases agree with results of those who have previously used inulin. I should like to remind the authors that the actual number of filtering glomeruli in chronic diffuse nephritis may not give one the true picture as to the available renal function. Oliver's reconstructions of different nephrons from chronically diseased kidneys show that there may be relatively much greater hypertrophy of the tubule than of the glomerulus; in some nephrons with enlarged tubules the glomerulus may even be absent. These anatomic facts of Oliver and functional results presented by Drs. Alving and Miller emphasize the importance of correlating function with structure. I am sure we all agree that such correlation is a major objective of clinical research.

DR. EMMET B. BAY, Chicago: I should like to ask the authors if one could use a factor of six times the inulin clearance rate to get the blood flow through the kidney in cases in which the inulin clearance is 2 per cent of normal.

DR. ALF S. ALVING, Chicago: We have not used this test in chronic pyelonephritis. I do not know whether Dr. Smith has done so, but it should be done. As regards renal flow, the normal flow is six times the glomerular filtration rate. Some workers have found that in essential hypertension the spasm of the afferent arterioles causes the filtration of a larger percentage of inulin by causing a back pressure in the glomerulus. Whether this holds for glomerulonephritis is not known.

The actual renal blood flow is perhaps a great deal higher, and we use the term "effective renal blood flow" for that reason to designate the blood flowing through actively functioning nephrons.

A Crystalline Pressor Substance, Angiotonin

IRVINE H. PAGE, M.D., and O. M. HELMER, PH.D., Indianapolis: When renin prepared by the method of Helmer and Page (1939) is allowed to react with renin activator (Kohlstaedt, Helmer and Page, 1939), a strongly pressor substance is produced which we have called "angiotonin." It is dialyzable, heat stable and alkali sensitive. Crystalline derivatives such as picrates and oxalates have been prepared. Incubation of renin with angiotonin destroys the latter; hence angiotonin is an intermediate product. It is somewhat similar to epinephrine and tyramine in its effect on blood pressure but exhibits few of their other properties. It is suggested that renin is an enzyme—not a pressor substance—which acts on a substrate (renin activator) to produce a pressor substance, angiotonin.

DISCUSSION

DR. GEORGE WAKERLIN, Chicago: Since the authors found that angiotonin increases the tone of the intestinal strip in vitro, if angiotonin is the effective pressor substance in experimental renal hypertension why is there no evidence of altered bowel motility in dogs with this type of hypertension? Moreover, if renin on intravenous injection exerts its pressor effect through producing angiotonin, as claimed by the authors, why is there no significant change in the tone or motility of the bowel when renin is injected intravenously in dogs in a dose sufficient to raise the blood pressure significantly?

DR. IRVINE H. PAGE, Indianapolis: The responses of intestinal strips in a bath may not be comparable with the responses in the intact animal. Renin itself produces no response in vitro simply because no activator is present. In answer to Dr. Wakerlin's second question, the concentrations of angiotonin used to cause contraction of the intestine in the bath are far greater than those required to produce pressor effects in the intact animal. If this reasoning is correct, much larger doses of angiotonin would be required to produce hypermotility of the intestine than to produce hypertension in the body.

Comparative Analysis of the Effects of Cold and Thyrotropic Substance on the Thyroid Gland

PAUL STARR, M.D., and RIGBY ROSKELLY, B.S., Chicago: Numerous workers have shown that there is hyperplasia in the thyroid of guinea pigs and rats which have been exposed to cold. Groups of rats were kept in an ice refrigerator under controlled conditions for three, seven, fourteen, eighteen, twenty-one, thirty-five, forty-five and fifty-six days. In all, seventy-five animals were used. The thyroid was then removed and prepared for microscopic study. The microhistometric method of Starr and Rawson was used to measure the degree of hyperplasia. Control animals living at room temperature had a mean thyroid cell height of 5.19 microns. After seven days in the cold the mean had risen to 5.97 microns, at fourteen days the mean was still only 6.10 and at twenty-one days it was 8.15 microns. After this time the cell height declined to 6.40 microns at fifty-six days. This curve thus has an early low plateau, an additional rise after fourteen days and a gradual fall, i. e. a complex concave curve. In comparison, the curve of cell height response to increasing doses of thyrotropic substance in guinea pigs shows early acceleration and gradual approach to a maximum response, i. e. a simple convex curve. This suggests different mechanisms of thyroid stimulation.

DISCUSSION

DR. ALLAN KENYON, Chicago: These observations are similar to my own of some time ago. There are big differences in response between various individuals, which may depend in part on the amount of iodine available in the diet. In my experience iodine inhibited the reaction to cold. I am looking forward to seeing what the authors will find when they use iodine and measure cell height by their exact technic. Not only did colloid accumulate under the influence of iodine in my experience but the cell height appeared to decline. This relationship is troublesome. In animals with simple goiter one sees great cell height and a low basal metabolic rate; then after iodine has been given the basal metabolic rate may increase sharply but the cell height declines and colloid accumulates. Of course in man with intense hyperthyroidism there are usually tall thyroid epithelium and depletion of colloid, but there are many variations and the reverse may occur. It seems therefore that cell height itself is an insufficient general indicator of the amount of hormone delivered to the body. This particular experimental circumstance seems to be one of the very few in which one has reason to believe that there is increased thyroid secretion and in which the physiologic chain of events seems to be normal. Therefore it is essential to continue its careful study in the hope of finding out more about this mechanism of normal thyroid stimulation.

DR. WILLIAM S. MIDDLETON, Madison, Wis.: I wish to recall the work of Tatum on the influence of environmental temperature on the activity of thyroxine. According to most textbooks thyroxine has a period of latency of about twenty-four hours. If the rabbit is placed in an environment above the temperature of the body, the effect of thyroxine may be speeded so that within half an hour to an hour these effects may be manifested on the circulation and respiration. If, contrariwise, the animal is placed in a cold environment with the temperature below that of the body there will be a prolongation of this latent period. I believe that we all appreciate that patients with thyrotoxicosis are much better off in cold than in warm weather and, from a practical point of view, I believe the implication is clear.

DR. MOSES BARRON, Minneapolis: I should like to ask whether there was a real hyperplasia present or only a simple hypertrophy. From the lantern slides it looked to me as if there was no actual increase in the number of cells but simply a hypertrophy present. If there should be an actual increase of cells in the acini, papillary projections would develop. The histologic picture suggests an attempt at increased function which did not progress to the point of an actual hyperplasia.

DR. E. PERRY MCCULLAGH, Cleveland: Any one who has had experience with bio-assay methods realizes that the ideal bio-assay is not yet at hand. The method used by the authors appears to be excellent for the assaying of thyrotropic hormone. I should like to emphasize one point with regard to the paper, namely that the degree of cell change in the thyroid is not the equivalent of hyperthyroidism. I believe that the authors do not wish to imply this, but I should like to have them express themselves definitely on this point. In this regard it may be worth pointing out that in untreated animals large thyroid glands may be seen which present a microscopic picture identical with that found in the human being in the presence of severe exophthalmic goiter, and yet the animal may have no evidence of hyperthyroidism in the ordinary sense of the word. It is clear, therefore, that the size of the cells lining the acini does not necessarily parallel the amount of hyperthyroidism present.

DR. PAUL STARR, Chicago: We have done some work on the administration of iodine after the hypertrophy has taken place with a resultant recession within ten days. I am glad to get Dr. Middleton's reminder of Tatum's work. It may be that the Tatum animals have a modified status of their own thyroid and therefore respond differently to the administration of thyroxine. With regard to Dr. Barron's question, we do not know whether there are any more cells or less, and, in response to Dr. McCullagh's remarks, we have avoided trying to make any comparisons with clinical hyperthyroidism. This method opens up the possibility of making a quantitative study of thyroid response to demand. We can study protection by nutritional factors, including iodine, vitamins, minerals, proteins and other elements of the diet, and we can study the effect of modification of the physiologic, anatomic relationships of the thyroid, as has been done by other observers. The superiority of this setup over the work recently done on cold is that we have a condition in which we are studying the response over a long period and we have an accurate means of measuring the microscopic changes. Animals thrive in this environment; in the other work they died in six or seven days.

(To be continued)

Current Medical Literature

AMERICAN

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Titles marked with an asterisk (*) are abstracted below.

American Journal of Ophthalmology, St. Louis

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Prophylactic and Therapeutic Effect of Bacteriophage and Antivirus in Experimental Staphylococcic Infection of Eye. J. Bronfenbrenner and S. E. Sulkin, St. Louis.—p. 1321.

Note on Immunology of Trachoma. L. A. Julianelle, St. Louis.—p. 1326.

*Vitamin D Complex in Progressive Myopia: Etiology, Pathology and Treatment: Preliminary Study. A. A. Knapp, New York.—p. 1329.

Unilateral Loss of Vision in Neurologic Disease. P. J. Leinfelder, Iowa City.—p. 1337.

*Asthenopia Due to Vitamin A Deficiency. F. C. Cordes and D. O. Harrington, San Francisco.—p. 1343.

Dermoid (Oil) Cyst of Orbit: Report of Case. W. E. Borley, San Francisco.—p. 1355.

Neuromyelitis Optica: Report of Case. A. G. Athens, Duluth, Minn.—p. 1360.

Tetanus and Prophylactic Use of Antitoxin Following Injuries of Eye. D. G. Cogan, Boston.—p. 1365.

Intra-Ocular Foreign Bodies: Some Comments Based on 120 Cases. E. S. Sherman, Newark, N. J.—p. 1368.

Visual Acuity Tests. S. S. Blankstein, Milwaukee, and Mary Jane Fowler, Chicago.—p. 1377.

Rhinosporidium of Conjunctiva: Case. W. B. Anderson and T. H. Byrnes, Durham, N. C.—p. 1383.

Rhinosporidiosis: Case Report. E. W. Griffey, Houston, Texas.—p. 1389.

Effect of Tartar Emetic on Course of Trachoma: Second Report. L. A. Julianelle, St. Louis; J. F. Lane, Albuquerque, N. M., and W. P. Whitted, Gallup, N. M.—p. 1390.

Vitamin D Complex in Progressive Myopia.—Knapp selected fifty-three patients because it was believed that their myopia would progress. Their age varied from 3 to 20 years. Their myopia ranged from —0.25 to —41 diopters. Vitamin D and calcium were prescribed. The dosage of the latter varied with the milk intake. For each glass of milk less than a quart two tablets of the calcium were added. Of the fifty-three patients, insufficient data were obtained on seven. Of the remaining forty-six, only twelve patients took their medication regularly. Six of these twelve showed a reduction in their myopia, two remained stationary and four progressed. Considering the forty-six patients without regard to the regularity of medication, sixteen had a reduction in their myopia, seven remained stationary, twenty-one progressed and two displayed a decrease of myopia in the left eye and a progression in the right. In other words, 66⅔ per cent of the patients who had medication either manifested a reduction in their myopia or remained stationary. It appears to the author that a disturbance in the vitamin D calcium-phosphorus metabolism is concerned in the etiology of myopia. In the presence of a calcium imbalance there may be a weakening of the fibrous tunic, which may give rise to myopia. Once a condition of progressive myopia has been established, treatment with the vitamin D complex is indicated. The myopic eyes that respond to this therapy may undergo an actual shrinkage of the globe. For the prevention of the onset of myopia, the vitamin D complex probably has another field of usefulness. Given a patient showing a diminishing degree of hyperopia and one who is approaching the axial myopia side, it would be well to fortify his diet with vitamin D and calcium. Assuming a disorder of the vitamin D complex metabolism to be a basic factor in the etiology of myopia, the author believes that the rarity of myopia in the American Indian, the fact that the rural inhabitant is freer from this complaint than the one residing in a city, that fewer myopic eyes are found in high altitudes and the prevalence of myopia in China are readily explained. Greater food consciousness, especially in relation to vitamin supply, explains why fewer cases of progressive myopia are seen today.

Asthenopia Due to Vitamin A Deficiency.—Cordes and Harrington observed eighty-two private patients between 13 and 78 years of age with persistent asthenopia in whom, as indicated by the biophotometer, there was a deficiency in vitamin A. Treatment was instituted only after sufficient time had elapsed to obtain all possible relief from the correction of the usual causes of asthenopia. In some the symptoms were so suggestive of vitamin A deficiency that the biophotometer reading was taken at the initial examination; in the majority, however, it was obtained when the patient returned, after a month or longer, complaining of persisting symptoms. Photophobia and sensitivity to glaring lights frequently accompany avitaminosis A and 69 per cent of the patients complained of being light sensitive. Aside from this there were certain characteristic symptoms complained of consistently. Of the patients 16 per cent were conscious of the eyes and uncomfortable when using them, 11 per cent complained of headache or blurring while driving, and approximately the same number had difficulty when viewing the movies. Seven patients had marked symptoms of asthenopia to the extent that they were unable to use their eyes. In a few instances headache when using the eyes was the principal complaint. The biophotometer readings before treatment was instituted ranged between 0.7 and 4.2 millifoot candles, the average being 2.09. If Jegher's normal of 0.75 millifoot candle is accepted, the average of 2.09 is low. After treatment and before discharge the average reading had been brought up to 0.9 millifoot candle. In only 22 per cent of the cases was it possible to obtain a history of any degree of night blindness. A history of dietary deficiency was obtained in 31 per cent of the cases. For treatment carotene in oil capsules were used. In the majority of cases 30,000 units (one 10,000 unit capsule three times a day) was given daily for a period of one month and then the biophotometer reading was repeated. With this and the subjective symptoms as a guide the carotene was continued or reduced in amount until an apparent balance was obtained. If carotene is absorbed faster from the intestinal tract than the liver can convert and store it, this surplus causes a yellow color (carotenemia) to appear in the body. It is not dangerous and disappears promptly when the carotene intake is reduced. Following carotene therapy 79 per cent of the patients experienced complete relief from their symptoms, 12 per cent received partial relief and 9 per cent obtained no improvement.

American Journal of Physiology, Baltimore

128: 1-202 (Dec.) 1939. Partial Index

Attempt to Condition Gastric Secretion to Histamine. S. Katzenelbogen, R. B. Loucks and W. H. Gantt, Baltimore.—p. 10.

Effect of Asphyxia on Reflex Inhibition. A. van Harreveld, Pasadena, Calif.—p. 13.

Study of Wallerian Degeneration. A. Rosenbluth and E. W. Dempsey, Boston.—p. 19.

New Results on Absorption of Insulin from Alimentary Tract. L. E. Young, W. A. Phillips and J. R. Murlin, Rochester, N. Y.—p. 81.

Effect of Various Conditions on Rate of Atrophy in Denervated Muscle. H. M. Hines and G. C. Knowlton, Iowa City.—p. 97.

Response of Brunner's Glands to Secretin. S. J. Fogelson and W. H. Bachrach, Chicago.—p. 121.

*Influence of Massive Doses of Insulin on Peripheral Blood Flow in Man. D. I. Abramson, N. Schloven, M. N. Margolis and I. A. Mirsky, Cincinnati.—p. 124.

Effect of Blood Flow on Potassium Liberation from Muscle. W. O. Fenn, W. S. Wilde, Ruth A. Boak and R. H. Koenemann, Rochester, N. Y.—p. 139.

Relative Cholinergic Effects of Selected Estrogens. S. R. M. Reynolds and Frances I. Foster, Brooklyn.—p. 147.

Effect of Chronic Cardiac Venous Occlusion on Coronary Arterial and Cardiac Venous Hemodynamics. J. J. Thornton and D. E. Gregg, Cleveland.—p. 179.

Studies on Increased Intracranial Pressure and Its Effects During Anoxia and Hypoglycemia. L. Yesinick and E. Gellhorn, Chicago.—p. 185.

Massive Doses of Insulin and Peripheral Blood Flow.—For determining the effect of massive doses of insulin on the peripheral circulation of seven patients with schizophrenia Abramson and his colleagues used the plethysmographic method. They state that a marked increase in blood flow was usually observed in the hand, forearm and leg at the height of the hypoglycemic response. When the hypoglycemia was terminated by the administration of carbohydrate a rapid decrease in blood flow to below the control level usually occurred, especially in the hand. When dextrose was given without the previous injection of insulin, this effect on the blood flow was not apparent.

It seems to the authors that conclusions relating to the metabolism of tissues based on changes in the chemical constituents of blood from these tissues are open to criticism, unless simultaneous blood flow studies are performed and correlated with the other data.

Archives of Neurology and Psychiatry, Chicago

43: 1-194 (Jan.) 1940

Action Potentials of Muscles in "Spastic" Conditions. P. F. A. Hoefer and T. J. Putnam, New York.—p. 1.
Results of Experimental Removal of Pineal Gland in Young Mammals. L. Davis and J. Martin, Chicago.—p. 23.
Modification of Gudden Method for Study of Cerebral Localization. A. Brodal, Oslo, Norway.—p. 46.
Studies in Multiple Sclerosis: Serum Enzymes. C. H. Richards and H. G. Wolff, with technical assistance of Marjorie Winegarten, New York.—p. 59.
*Effect of Phenobarbital on Mentality of Epileptic Patients. Esther Somerfeld-Ziskind and E. Ziskind, Los Angeles.—p. 70.
Relation of Ventricular Asymmetry to Contracting Intracranial Lesions. J. S. Robertson, Glasgow, Scotland, and A. E. Childe, Montreal.—p. 80.
Relation of Anoxemia to Early Activity in Fetal Nervous System. W. F. Windle and R. F. Becker, Chicago.—p. 90.
*Clinical Study of Anxiety Attacks. H. L. Kozol, Baltimore.—p. 102.
Congenital Demyelinating Encephalopathy. R. P. Mackay, Chicago.—p. 111.
Probable Topographic Relations of Sleep-Regulating Center. J. H. Globus, New York.—p. 125.

Effect of Phenobarbital on Mentality of Epileptic Patients.—Somerfeld-Ziskind and Ziskind think that the hazards of phenobarbital are often overemphasized. Among 600 cases of convulsive states, large doses of phenobarbital were often necessary to keep patients free from seizures, yet they never encountered an instance of serious idiosyncrasy to the drug. Mental deterioration does occur in a variable percentage of epileptic patients, and it is conceivable that chronic intoxication with drugs may be partly responsible. However, most of the pertinent statements in the literature are conjectural. The authors subjected the matter to investigation, since they could discover no controlled study as to the effect of phenobarbital on the sensorium. One hundred noninstitutionalized epileptic patients composed their series. After thorough diagnostic studies the patients were given six psychologic tests, including the Stanford-Binet test. The mean intelligence quotient was 93, seven points lower than the generally accepted average for a normal community. In the cases of cryptogenic epilepsy the average intelligence quotient was 97, but in those of the symptomatic type it was only 88. Most mental traits were normal except memory, attention and language ability, which were somewhat deficient. Tests containing primarily motor elements gave lower scores than was anticipated. The reaction time in free association tests was slower than for normal persons. Patients treated with phenobarbital showed a marked reduction in the number of spells. In all, 79 per cent of forty-eight patients given phenobarbital for a year were either free from attacks or definitely improved. The treated patients, although more severely afflicted at the outset, had only 20 per cent as many convulsions as did the controls during the trial year, and only 15 per cent as many petit mal attacks. Psychologic tests performed before and after one year of treatment with phenobarbital showed no impairment in the mentality of forty-eight epileptic patients. The control group of forty-two epileptic persons likewise did not deteriorate. Seven patients were tested before and after two years of phenobarbital therapy. On the whole, the slight changes after two years of treatment were in the direction of normality. In thirteen cases the first year was used as a control and phenobarbital was given throughout the second year. There was some improvement in performance with the psychologic tests after the year of treatment. This study indicates that phenobarbital in doses of 1½ grains (0.1 Gm.) two or three times a day can be given for two years without resultant deterioration of the intellect.

Study of Anxiety Attacks.—Acute attacks of anxiety were the principal feature of the forty-eight cases on which Kozol based this study. The age at onset of the attacks was under 30 in thirty-three cases. In all cases circumscribed attacks were present. Forty-one of the patients spontaneously used the word "fear" in describing how they felt. In every instance the fear related to an imminent personal catastrophe of the patient himself. All but one of the patients emphasized disturbing bodily states. More than half did not show the full picture of physical symptoms described in anxiety attacks; namely, palpitation choking, dry mouth, cold sweat, numbness of the extremities, epigastric discomfort and urge to defecate. In the majority of cases, however, the most common complaints were palpitation, choking and urge to defecate. These patients as a group lack insight into the possible relationship between the attacks of anxiety and apparently obvious situations. In scrutinizing their life situations, potentially disturbing factors appeared in all the cases. Threats of frustration of ambition were nearly as common and important as sexual factors. Personality traits characteristic of this group of patients are egotism, self centeredness, sensitiveness to the opinions of others, ambitiousness, aggressiveness, intensity, apprehensiveness and anticipatory trends. In only four instances was there complete absence of personality imbalance in other members of the family. Treatment began with a search for the actual facts. When possible, practical help was given in changing the situation. Psychoanalysis was not systematically carried out in more than one case. Results of treatment were not dramatic. The attacks usually subsided while the patients were in the hospital. Twenty-eight of the patients have been followed up, one for twenty-three years. In all, improvement came with time, but few attained absolute freedom from attacks.

Archives of Ophthalmology, Chicago

22: 947-1172 (Dec.) 1939

Clinical Detection of Early Changes in Visual Field. H. M. Traquair, Edinburgh, Scotland.—p. 947.
Injection of Air as Factor in Maintaining Filtration After Corneoscleral Trephining in Glaucoma. J. A. MacMillan, Montreal.—p. 968.
Retinal Detachment Cured by Eyeball-Shortening Operation: Report of Case. D. K. Pischel and Miriam Miller, San Francisco.—p. 974.
*Effect of Anoxemia on Dark Adaptation of Normal and of Vitamin A-Deficient Subject. R. McDonald and F. H. Adler, Philadelphia.—p. 980.
Malignant Melanoma So-Called Sarcoma of Uvea: II. Problems in Diagnosis. T. L. Terry, Boston.—p. 989.
*Cataract Following Inhalation of Paradichlorobenzene Vapor. M. L. Berliner, New York.—p. 1023.
Iridencleisis in Glaucoma. E. L. Goar and J. F. Schultz, Houston, Texas.—p. 1035.
Relative Sizes of Ocular Images of Two Eyes in Asymmetric Convergence. K. N. Ogle, Hanover, N. H.—p. 1046.
The Myopia Problem. A. deH. Prangen, Rochester, Minn.—p. 1083.

Effect of Anoxemia on Dark Adaptation in Vitamin A Deficiency.—By a change in certain fundamental metabolic requirements, McDonald and Adler caused the normal dark adaptation curve to become altered. They first reduced the amount of oxygen in the circulating blood and during the period of anoxemia a temporary but significant upward displacement of the intensity curve by a factor of 2.5 ($\log I = 0.4$) was observed; that is, the rod and cone thresholds were both raised by an equal amount, but the rate of adaptation was apparently unchanged. A reduced dietary intake of vitamin A caused an unequal rise in the rod and cone thresholds, the rod threshold showing the greater variation. This suggests that even though anoxemia and vitamin A deficiency both change the character of the adaptation curve, they act on different processes in the visual cycle. The rise in threshold due to anoxemia is simply additive and is the same in the normal and in the vitamin A deficiency state. This is further substantiated by the fact that vitamin A deficiency does not alter the effect produced by oxygen lack. It is known that vitamin A is concerned with the photochemical basis of the visual response, and it is probable that anoxemia acts elsewhere in the visual system, i. e. on the nerve mechanism.

Cataract After Inhalation of Paradichlorobenzene Vapor.—Berliner cites two cases of jaundice, loss of weight and cataract formation in young women following exposure to paradichlorobenzene vapor for one and two years respectively. The history in each case suggests a toxic hepatitis due to continued exposure to the fumes of this moth-repelling drug. The changes in the lenses appeared as a delayed reaction several months after the patients were removed from the influence of the fumes of this drug, a phenomenon strikingly similar to that observed in cataracts due to the toxic effects of dinitrophenol. Paradichlorobenzene inhaled in sufficient concentration caused the death of guinea pigs and rabbits and produced vacuolation

and necrosis of hepatic cells, principally in the central portion of the liver lobule. No lenticular changes appeared except in one experimental rabbit which was fed the drug orally. The public should be warned of the toxic properties of this drug, manufacturers and distributors of the product should be required to label containers properly that are sold to the general public, and the medical profession and health authorities should be apprised of the danger of prolonged inhalation of the fumes of paradichlorobenzene.

Archives of Otolaryngology, Chicago

30: 863-1076 (Dec.) 1939

Tonsillectomy: Local Results and Influence of Operation on Surrounding Tissues. E. H. Campbell, Philadelphia.—p. 863.
Nursing, Feeding and Parenteral Administration of Fluids. W. E. Grove, Milwaukee.—p. 872.
Transfusions of Blood in Care of Patients After Operations for Otitic Sepsis. J. M. Sutherland, Detroit.—p. 876.
Chemotherapy. T. C. Galloway, Evanston, Ill.—p. 901.
Simple Quantitative Method of Testing Vestibular Function. M. Atkinson, New York.—p. 916.
Structure of Petrous Portion of Temporal Bone, with Special Reference to Tissues in Fissular Region. B. J. Anson and J. G. Wilson, Chicago. —p. 922.
Congenital Cysts of Larynx: Report of Case. G. B. New and J. B. Erich, Rochester, Minn.—p. 943.
*Treatment of Otitic Meningitis. D. S. Cunning, New York.—p. 950.
Intranasal Dacryocystotomy. W. E. Sauer, St. Louis.—p. 973.
Chronic Progressive Deafness, Including Otosclerosis and Diseases of the Inner Ear. G. E. Shambaugh Jr., Chicago.—p. 999.

Treatment of Otitic Meningitis.—According to Cunning, attempts at treatment of otitic meningitis have been disappointing. Reports covering several thousand cases indicate mortality rates of from 95 to 98 per cent. In this paper Cunning describes the treatment and results in fourteen cases of otitic meningitis and in one case of meningitis following submucous resection. Only cases in which the pathogenic organism was actually recovered from the spinal fluid are included in this report. Treatment was similar in all cases, namely a combination of radical surgical intervention, daily spinal drainage and the intensive use of sulfanilamide or one of the related compounds. Blood transfusions and intravenous administration of dextrose were employed during the same period. In this series of fifteen consecutive cases of meningitis, eleven patients recovered and four died. Sulfanilamide, while obviously extremely important, is apparently not sufficient in itself to produce a cure. Surgical intervention in itself is not sufficient, and it seems that a combination of the two, namely sulfanilamide and surgical intervention, offers the best hope. In the use of the drug it is important that treatment be started early, that the dose be large and that the treatment be continued for several weeks after cessation of symptoms. Surgical measures likewise should be instituted as soon as the diagnosis is made. In seven of eight cases in which the invading organism was Streptococcus haemolyticus, recovery occurred. In two cases in which the organism was pneumococcus type I and one case in which the organism was pneumococcus type III, death occurred. Had sulfapyridine been known when the pneumococcic infections were treated, the results might have been better. Six patients showed paralysis of the external rectus muscle. It seems that with the use of sulfanilamide plus surgical intervention meningitis is not necessarily to be considered as formidable as formerly.

Archives of Pathology, Chicago

28: 777-944 (Dec.) 1939

Influence of Androgens on Growth and Metastasis of Brown-Pearce Epithelioma. J. R. Murlin, C. D. Kochakian, C. L. Spurr and R. A. Harvey, Rochester, N. Y.—p. 777.
Aspiration Type of Congenital Tuberculosis. H. S. Reichle and M. C. Wheelock, Cleveland.—p. 799.
Subdural or Intradural Hemorrhages. T. Leary, Boston.—p. 808.
Origin and Significance of Binucleate Purkinje Cells in Man. W. Andrew, Dallas, Texas.—p. 821.
Cardiac Lesions in Rabbits Produced by Filtrable Virus (Virus III). J. M. Pearce, Brooklyn.—p. 827.
Effect of Potassium Iodide on Bone and Cartilage in Thyroidectomized Immature Guinea Pigs. M. Silberberg and Ruth Silberberg, St. Louis. —p. 846.
Role Played by Trauma in Dissemination of Tumor Fragments by Circulation: Tumor Studied: Brown-Pearce Rabbit Epithelioma. A. G. Ide, R. A. Harvey and S. L. Warren, Rochester, N. Y.—p. 851.
Histology of Thyroid in Exophthalmic Goiter and Hyperthyroidism. C. A. Hellwig, Wichita, Kan.—p. 870.

California and Western Medicine, San Francisco

51: 355-414 (Dec.) 1939

Headaches of Chronic or Recurring Type: Considered from the Point of View of the Internist. D. L. Wilbur and L. R. French, San Francisco.—p. 362.
Headaches: From the Point of View of the Ophthalmologist. W. D. Horner, San Francisco.—p. 367.
Id.: From the Point of View of the Otolaryngologist. H. J. Cohn, San Francisco.—p. 369.
Unilateral Cerebral Dominance: Consideration of Some of Its Manifestations. K. O. Von Hagen, Los Angeles.—p. 371.
*Gallbladder: Its Relation to Chronic Arthritis of Uncertain Etiology. R. S. Peers, Oakland.—p. 374.
Endonasal Tear Sac Operation. B. L. Bryant, Los Angeles.—p. 376.
Mental Hygiene as a Department of Public Health Activity: Report of Study on 9,527 Cases. J. C. Geiger and Olga Bridgman, San Francisco.—p. 378.
Anesthetics: Plea for Accurate Rating. P. Campiche, San Francisco. —p. 381.
Hyperostosis Calvarii Interna: Its Clinical Significance. B. N. Tager, E. K. Shelton and W. C. Matzen, Los Angeles.—p. 384.
Management of Senile Patients for Anesthesia and Operation. W. Lawrence, San Francisco.—p. 388.

Gallbladder and Arthritis.—Peers studied the relation of the function of the gallbladder in seventy-one cases of chronic arthritis of unknown etiology. As revealed by the sodium tetraiodophenolphthalein test twenty-five patients had normally functioning gallbladders. On examination and questioning, ten of these patients gave no history of gastrointestinal complaints, fifteen complained of one or more of the usual symptoms of low grade indigestion and x-ray visualization of the remaining forty-six revealed stones or there was a marked variation from normal as to filling, concentration or emptying of the gallbladder. Four of the forty-six patients were reported as having gallstones and six as having no visualization of the gallbladder. Three of these six patients whose gallbladders did not react to the dye had a negative clinical history. Twelve of the remaining thirty-six patients who presented atypical observations had negative clinical histories in relation to their gastrointestinal tracts. Of the twenty-five patients reported as having normal roentgenograms twelve were considered to have arthritis of the rheumatoid type, eight osteo-arthritic and five of the mixed type. The arthritis of the forty-six patients reported with positive changes of the gallbladder was rheumatoid in thirteen, osteo-arthritic in thirteen and mixed in twenty.

Canadian Medical Association Journal, Montreal

41: 527-622 (Dec.) 1939

Epilepsy and Cerebral Lesions of Birth and Infancy. W. Penfield, Montreal.—p. 527.
Inclusion Conjunctivitis. S. H. McKee, Montreal.—p. 535.
Bronchoscopy in Sanatorium. J. H. Holbrook and P. Rabinowitz, Hamilton, Ont.—p. 542.
Plastic Surgery at Seventy-Two. J. W. Gerrie, Montreal.—p. 548.
Nature of War Neuroses. C. K. Russel, Montreal.—p. 549.
Treatment of Pneumonia. M. Finland, Boston.—p. 554.
*Treatment of Paget's Disease by Adrenal Cortical Preparations. E. M. Watson, London, Ont.—p. 561.
Complications of Diabetes Mellitus, with Special Reference to Cause and Prevention. A. A. Fletcher and J. W. Graham, Toronto.—p. 566.
*Treatment of Hemangiomas of Skin in Children by Carbon Dioxide Snow. N. M. Wrong, Toronto.—p. 571.
Neuropathies of Colon as Seen by X-Rays. M. C. Morrison, London, Ont.—p. 573.
Significance of Melena in Children. H. Little, London, Ont.—p. 575.
Acute Toxic Nephritis Due to Inhalation of Carbon Tetrachloride Fumes. M. A. Simon, Montreal.—p. 580.
Congenital Hemihypertrophy. H. H. McGarry, Niagara Falls, Ont.— p. 583.

Adrenal Cortex Extract for Paget's Disease.—Watson treated nine patients with Paget's disease of the bones with adrenal cortex extract. This was injected once a week into the gluteal muscles in amounts of from 5 to 10 cc. or more. In the majority of the patients there was undoubted clinical improvement, exemplified by cessation or lessening of the pain and by an increased sense of well being. Biochemical improvement occurred in all of the cases as indicated by a reduction of the serum phosphatase. In view of the favorable results which have accompanied the use of desoxycorticosterone acetate in Addison's disease, the author used this compound as a substitute for the cortical extract in some of the cases of Paget's disease. Also, a preparation of adrenal cortex designed for oral administration was tried in some instances. Injections of desoxycorticosterone acetate and the oral administration of the desiccated adrenal cortex extract did not produce as pronounced therapeutic effects in Paget's disease as did injections of the extract in solution. It is not suggested that Paget's disease

is a manifestation of adrenal insufficiency correctable by substitution therapy. Any attempt to explain the apparent salutary effect of adrenal glandular products on patients with Paget's disease would be pure speculation at the present time. That adrenal cortex extract may influence in some peculiar manner the underlying metabolic derangement in Paget's disease is suggested by the fact that a patient with cystic fibrous osteitis and an associated hyperphosphatasemia was treated with adrenal cortex extract without any reduction of the serum phosphatase or relief of pain. The fact that the synthetic cortical hormone, desoxycorticosterone acetate, did not seem to be as efficient in lowering the serum phosphatase or relieving the symptoms of patients with Paget's disease suggests that something in the cortical extract other than the hormone was responsible for the results. Williams has shown that adrenal cortex extract does not inactivate or inhibit bone phosphatase in vitro. Therefore it must be assumed that the therapeutic effects cannot be explained on the basis of inactivation or inhibition of the enzyme in the blood stream by the extract following its injection, but rather that a modifying influence is exerted on the tissue cells. Pending the acquisition of further scientific data the employment of adrenal glandular preparations in Paget's disease, although encouraging, must remain at best an empirical form of treatment.

Treatment of Hemangiomas with Solid Carbon Dioxide.—At the Hospital for Sick Children, 156 children with hemangiomas of various types were seen in the skin clinic during 1934 and 1935. In the spring of 1937 Wrong asked these patients to report for observation and seventy-eight did so. Of the seventy-eight patients fifteen had more than one lesion and the largest number of lesions treated with solid carbon dioxide on any one child was four. Of the ninety-six hemangiomas treated the results were excellent in thirty-seven, good in twenty-three, fair in sixteen and poor in twenty. Most of the good results were obtained in the tumors which were less than 1 cm. in diameter. When the tumor was between 1 and 2 cm. there were as many indifferent results as good ones. When the size reached more than 2 cm. the good results were few. A complicating factor to consider is that most of the larger lesions were also deep. The depth of the tumor is an important factor in determining whether a tumor will respond to freezing by solid carbon dioxide or not. The results in the thin lesions were nearly all excellent or good. In the thicker lesions this condition was somewhat reversed, and in the thick and pulpy lesions, i. e. those with subcutaneous involvement, there were no good results.

Endocrinology, Los Angeles

25: 845-1042 (Dec.) 1939. Partial Index

*Analysis of 583 Glucose Tolerance Tests. B. A. Watson, Minneapolis.—p. 845.

*Response of Chronically Fatigued Neurotic Patients to Adrenal Cortex Therapy. J. H. Huddleson and R. A. McFarland, New York.—p. 853.

Size of Spleen and Adrenals During Pregnancy and Puerperium. C. K. Sheth and E. J. Van Liere, Morgantown, W. Va.—p. 867.

Assay of Cortical Hormone. I. E. Uyldert, Amsterdam, The Netherlands.—p. 871.

Effect of Single Injection of Thyroxine on Carbohydrates, Protein and Growth in Rat Liver. R. Sternheimer, Chicago.—p. 899.

Repression and Resorption of Corpora Lutea of Early Pregnancy Following Injections of Testosterone Propionate. H. O. Burdick and B. Emerson, Alfred, N. Y.—p. 913.

*Histologic Changes in Senile Vagina Induced by Estrogenic Therapy Administered Orally and by Inunction. Rita S. Finkler and W. Antopol, Newark, N. J.—p. 925.

Effect of Large Doses of Testosterone Propionate (Oreton) on Female Genital Tract of Very Young Rat: Production of Ovarian Cysts. H. Shay, J. Gershon-Cohen, K. E. Paschkis and S. S. Fels, Philadelphia.—p. 933.

Biologic Assay of Melanophore Hormone of Pituitary Gland. R. S. Teague, Chicago.—p. 962.

Effects of Hypophysectomy on Blood Picture of Rat. E. P. Vollmer, A. S. Gordon, I. Levenstein and H. A. Charipper, New York.—p. 970.

Dextrose Tolerance Tests.—Among 51,096 routine urine examinations of students (average age 22.7 years) Watson found glycosuria to occur 583 times, or in 1.14 per cent of the cases. Of 33,125 urine examinations of male students glycosuria occurred 368 times, or in approximately 1.11 per cent, while among 17,971 such examinations of female students glycosuria was found 215 times, or in 1.19 per cent. In determining the incidence of glycosuria during tolerance test and its effect on mean blood sugars 186 of the 368 men and fifty-seven of the 215 women had glycosuria on one or more occasions during the test. Why almost twice as many men as women showed glycosuria is difficult to explain, as all subjects were given 100 Gm. of dextrose and the test was carried out under the same conditions in the two sexes. Of the 583 persons studied, ninety (15.4 per cent) had evidence of a definitely disturbed dextrose tolerance. Only forty-nine of the 583 subjects had a previous history of glycosuria and thirty-three of these forty-nine subjects had glycosuria sometime during the tolerance test. All blood sugar values of these subjects were slightly elevated except that of the fasting specimen. Some of these individuals might have had a mildly disturbed carbohydrate metabolism when glycosuria was first found, but because another urine specimen may have shown no sugar they were not treated at the time. Thus, during the elapsed time between the first and the second diagnosis of glycosuria one might expect a further loss of carbohydrate tolerance. A study of the relation of weight to the tolerance test revealed that the underweight (less than 90 per cent of normal) and normal weight subjects of both sexes had higher blood sugar values than the overweight (more than 10 per cent over normal weight) group. Of the 583 students with glycosuria, 67.7 per cent were of normal weight, 16.1 per cent were underweight and 16.1 per cent were overweight. This appears to be a normal weight distribution among the general college population. From the data obtained the author asserts that it is impossible to demonstrate that obesity by itself plays any part in the causation of a disturbed dextrose tolerance test. In fact, he believes that on a basis of his observations one would predict that underweight persons would be more likely candidates for disturbed carbohydrate metabolism than those who are overweight. Thus one may conclude that in this age group obesity plays no important part in the etiology of a disturbed carbohydrate metabolism. Among 109 students with a family history of diabetes the incidence of disturbed dextrose tolerance tests was 17.4 per cent as compared with 14.9 per cent among the remaining 474 students with glycosuria but with no family history of diabetes. Thus heredity cannot be considered an important etiologic factor in the production of a disturbed carbohydrate metabolism in this age group.

Fatigue of Neurotic Patients and Adrenal Cortex.—Huddleson and McFarland gave orally glycerinated adrenal cortex (pills) to fourteen patients suffering from psychoneuroses marked by asthenia. The experimental period for each patient was from ten to fifteen weeks. One week no medication was given, followed by two weeks of placebos. These three weeks, and occasionally later on placebos were given for a week, served as controls. The increasing doses of adrenal cortex pills ranged from fifteen to forty-eight pills daily, each pill representing 3 grains (0.2 Gm.) of fresh gland. Half the patients reported subjective improvement. Half gained a kilogram (2⅕ pounds) in weight. The basal metabolism weight was accelerated (improved) in eight. The Schneider index was bettered in nine and unaffected in five. The inventories of psychologic and of physiologic complaints showed improvement, respectively, in seven and six of the ten patients so tested. The word association test indicated fewer neurotic responses in seven, neuromuscular coordination was improved in five and perseveration was lessened in four. Following the medication, objective tests showed improvement of more than half of the patients. Seemingly this treatment has proved valuable in obstinate asthenic psychoneurosis.

Changes Induced in Senile Vagina by Estrogen.—According to Finkler and Antopol, of thirty-seven patients presenting symptoms of senile vulvovaginitis twenty-one were treated by local application of estrogenic ointment and sixteen were given estrogenic substances orally. Topical application, especially to patients who had only slight or no general menopausal symptoms, alleviated the symptoms of senile vulvovaginitis and produced pronounced histologic changes in the vagina. Patients presenting inflammatory changes superimposed on an atrophic vaginal mucosa responded rapidly to local treatment. Evidence that systemic absorption takes place in the course of inunction was manifested by slight to moderate improvement in the vasomotor symptoms of the menopause and a recurrence of uterine bleeding in one case. Oral administration of estrogens also proved of value. The results were similarly beneficial. This

form of therapy is indicated in patients presenting marked vasomotor disturbances in addition to the symptoms of senile vulvovaginitis. In many instances oral medication was substituted for intramuscular medication, because of the reappearance of uterine bleeding after injection treatment. Uterine bleeding, however, occurred in the two patients treated orally with diethylstilbestrol. This would seem to indicate unusual oral activity of the substance. Such bleeding did not occur in patients receiving two other estrogenic preparations. Of the twenty-one patients treated by inunction, six obtained partial relief and fifteen showed marked improvement. Of the sixteen patients treated orally, only one failed to respond. Better cooperation on the part of the patient was obtained when the treatment was given orally.

Florida Medical Association Journal, Jacksonville

20: 265-316 (Dec.) 1939

Evaluation of More Common Serodiagnostic Tests of Syphilis. J. N. Patterson, Jacksonville.—p. 275.
Value of Tuberculin Test. P. P. McCain, Sanatorium, N. C.—p. 279.
Differential Diagnosis in Tuberculosis Work. N. M. Marr, St. Petersburg.—p. 281.
Primary Tuberculosis in Adults. N. O. Pearce, Miami Beach.—p. 283.
Therapeutic Pneumothorax: Its Technic, Indications and Value. W. O. Fowler, Orlando.—p. 285.
Will X-Rays Replace the Clinician in Diagnosis of Early Tuberculosis? C. M. Gray, Tampa.—p. 287.
Meckel's Diverticulum: Report of Case with Simple Inversion Causing Partial Obstruction of Ileum. L. W. Martin, Sebring.—p. 290.

Illinois Medical Journal, Chicago

76: 489-576 (Dec.) 1939

Use of Progestin in Obstetric Complications. F. H. Falls, Chicago.—p. 507.
Obstruction of Common Bile Duct by Stones. W. H. Cole, Chicago.—p. 512.
Influence of Health Education on Practice of Medicine. W. W. Bauer, Chicago.—p. 519.
Rheumatic Fever in Children: Etiology. G. L. Drennan, Jacksonville.—p. 524.
Signs and Symptoms of Rheumatic Fever. K. Woodward, Rockford.—p. 526.
Treatment of Rheumatic Fever in Children. H. W. Elghammer, Chicago.—p. 527.
Pathology of Rheumatic Fever. S. Gilson, Chicago.—p. 530.
*Stuttering as Emotional and Personality Disorder. M. Solomon, Chicago.—p. 536.
Etiology and Differential Diagnosis of Gastric Hemorrhage. M. M. Montgomery, Chicago.—p. 542.
Retro-Auricular Fistula Following Mastoid Operations: Report of Case Following Radical Mastoidectomy with Remarks on Selection of Procedure. H. V. Wadsworth and G. H. Woodruff, Joliet.—p. 547.
Obstetric Rectal Examination. A. J. Mauery, Chicago.—p. 549.
Care of the Newborn. R. A. Loar, Bloomington.—p. 551.
Two Years' Experience with Audiometer in the Springfield, Ill., Schools. G. Koehler, Springfield.—p. 555.
Intractable Peptic Ulcer. C. H. Drenckhahn, Urbana.—p. 557.
Tuberculosis in Children, Considering Contact in Domestic Servant. E. T. McEnery, Chicago.—p. 559.
*Psychoses with Pernicious Anemia. G. A. Wiltrakis and A. V. Partipilo, Chicago.—p. 562.
Cancer of Cervix. M. S. Underhill, Evanston.—p. 566.
Review of Metrazol Treatments. M. Isenberg, East Moline.—p. 568.

Stuttering as Emotional and Personality Disorder.—Solomon believes that stuttering is a specifically conditioned personality, emotive behavior and speech disorder in the struggle for equilibrium during social converse. It is a type of adjustive behavior. As stuttering is an overactive response of the total personality, there are responses at all levels of activity, depending on the stage of maturation of the individual. The objective phenomena are present in varying degree and quality in the first and recurrent moments of stuttering. They include: (1) activities in the peripheral speech machinery; disruption of coordination of the oral, laryngeal and respiratory systems, with terminal speech block, either clonic and incomplete as in hesitation and repetition or tonic and complete as in failure to produce any sound, (2) skeletal manifestations, with postural, gestural reactions from head to toes, (3) visceral and autonomic responses, from tachycardia to secretory and excretory changes and (4) physiochemical upheaval, peripheral and central, including electroencephalographic manifestations. The subjective, so-called mental, phenomena occur in the first moment of stuttering, when there seems to be mainly a state of excitement (which may be preceded or followed by other emotions). With recurrent moments the final product is very complex. Generalized expectancy occurs whenever the stutterer confronts a conditioned social speech situation and is often accompanied by a search for speech difficulty and a rehearsal of planned verbal expression. Specific expectancy occurs when he attempts a specific word. This gives rise to various expectant devices, such as avoidance, giving up the speech attempt, substituting a different word; postponement, pausing, repeating preceding words; initiation or using "starter" words; antiexpectancy and disguise, a monotone, singsong speech, and preparatory set for release reaction. Stuttering is a clinical syndrome. Careful consideration of all internal and external factors responsible for its onset and continuation is essential (physical condition, the routine daily program and habits, the personality makeup and problems, the living conditions and personalities in the home, neighborhood, school and workshop). Treatment should include the total personality and not only the speech phenomena. It should be a combination of physical and mental hygiene, physical therapy, psychotherapy and environmental therapy adapted to the particular patient, with the goal of readjustment. Especially valuable is intensive personality study and reorganization leading to better peace of mind and social adjustment. Stuttering can be properly understood only by the application of basic scientific principles.

Psychoses with Pernicious Anemia.—From 1931 to 1938, Wiltrakis and Partipilo encountered twenty-four cases of pernicious anemia among the 13,023 mental patients admitted to the Elgin State Hospital. The diagnosis of nine, in addition to the anemia, was psychosis, of seven paranoid symptom complexes, three were classified psychosis with cerebral arteriosclerosis and the others had various mental diagnoses. The pernicious anemia was considered the primary cause of the psychosis of sixteen of the twenty-four cases. In twelve the anemia was observed prior to the onset of mental symptoms and in the remaining four within a maximal period of one year after the onset of psychosis. The psychosis of pernicious anemia is not characterized by any specific form of mental behavior, yet certain mental symptoms predominate. A marked irritability is frequently present and paranoid states, confused states and depressions are observed often. Undoubtedly the prepsychotic personality is of considerable importance in the reaction pattern. Prominent among these symptoms are marked irritability and uncooperativeness. The adjectives frequently used in literature in describing the behavior of these patients are irritable, stubborn, peevish, surly, obstinate, disagreeable, faultfinding, cantankerous and refractory. A pronounced symptom of nine of the sixteen patients was irritability. Prognosis in this psychosis is poor, yet mental recoveries do occur and the patients should be given the benefit of prolonged and extensive antianemia therapy.

Iowa State Medical Society Journal, Des Moines

29: 589-640 (Dec.) 1939

Blood Sedimentation Test. F. H. Lamb, Davenport.—p. 589.
*Use of Vitallium for Fixation of Fractures. W. C. Campbell, Memphis, Tenn.—p. 591.
Insomnia. J. S. McQuiston, Cedar Rapids.—p. 595.
Silk and Surgical Wound. M. J. Brown, Davenport.—p. 600.
Neurosis and Digestive Disorders. H. C. Bone, Des Moines.—p. 603.
Serum Treatment of Pneumonia. R. N. Larimer, Sioux City.—p. 607.
Some Recent Developments in Plastic Surgery. L. H. LaDage, Davenport.—p. 609.

Vitallium for Fixation of Fractures.—Because of the many disastrous results observed, Campbell formerly avoided the use of metal plates for the fixation of fractures, but after the introduction of vitallium he began to use it for selected cases. Since February 1937 he has employed this material in 108 cases. Roentgenograms made over a period of several months have shown no evidence of absorption of the bone about the screws or of inflammatory changes in the soft tissues. Callus appears to have covered the plate partially in many of the cases. Eight plates have been removed at periods varying from four to ten months after operation. In every case the screws were firmly embedded in the bone, necessitating removal with a screw driver. There was no evidence of corrosion or tarnishing of the metal, nor was the soft tissue about the plates stained; rather, it appeared to be normal scar and fibrous tissue such as is found in the healing of any surgical wound. Accurate alinement of the fragments was maintained in all fractures with the exception of one. A review of a large number of fractures from which wires, pins and screws of ferrous materials, Parham bands and steel plates of the Lane type were removed shows that ferrous materials often induce an unfavorable tissue reaction about the fracture site; yet obviously inefficient mechanical fixation is a

definite factor in producing complications requiring removal of the material. Laxity in the practice of strict asepsis also contributes to a not inconsiderable number of disastrous results following open reduction and internal fixation. Exposure converts a simple fracture into a compound fracture, with many of its risks. However, with proper observance of asepsis and accurate fixation by vitallium the dangers of open reduction and internal fixation are minimized and are outweighed by the advantages of replacement and maintenance of the fragments in anatomic position.

Johns Hopkins Hospital Bulletin, Baltimore

65: 431-508 (Dec.) 1939

Electrocardiographic Changes in Acute Hemorrhagic Nephritis. R. D. Williams, Baltimore.—p. 434.
Cyanosis in Chickens and Mice Induced by Sulfanilamide. A. P. Richardson, Baltimore.—p. 445.
Coincidence of Diabetes Mellitus and Addison's Disease: Effect of Cortical Extract on Glycemia and Glycosuria. A. L. Bloomfield, San Francisco.—p. 456.
*Further Studies on Effect of Sulfanilamide on Experimental Tuberculosis. R. H. Follis Jr. and A. R. Rich, Baltimore.—p. 466.
Nerve Endings in Cardiac Muscle of Rat. A. B. King, Baltimore.—p. 489.

Sulfanilamide and Experimental Tuberculosis.—Follis and Rich observed the effect of sulfanilamide on experimental tuberculosis in the rabbit, and the results confirm their previous study on the guinea pig which demonstrated that adequate doses of the drug, properly administered, have a definite inhibitory effect on the development of the disease. Individual rabbits exhibit marked differences in the degree to which they acetylate the drug and in their ability to attain and maintain a high concentration of the drug in the blood following the administration of a given dose. These differences undoubtedly play a part in determining the degree to which a given dose of the drug will exert a beneficial effect on the progress of the tuberculosis in different animals. No conclusions regarding the effect of sulfanilamide on human tuberculosis should be drawn from the experiments, as that requires a separate and carefully controlled study.

Journal of Experimental Medicine, New York

70: 543-660 (Dec.) 1939

Quantitative Studies of Prostatic Secretion: I. Characteristics of Normal Secretion; Influence of Thyroid, Suprarenal and Testis Extirpation and Androgen Substitution of Prostatic Output. C. Huggins, M. H. Masina, Lillian Eichelberger and J. D. Wharton, Chicago.—p. 543.
Further Studies on Blood and Hematopoietic Tissues in Malignant Panleukopenia of Cats. W. D. Hammon and J. F. Enders, Boston.—p. 557.
Experimental Studies on Virus of Infectious Avian Encephalomyelitis. P. K. Olitsky, New York.—p. 565.
Masking Effect of Extravasated Antibody on Rabbit Papilloma Virus (Shope). J. G. Kidd, New York.—p. 583.
Blood Plasma Proteins as Influenced by Intravenous Injection of Gum Acacia: II. Production of Chronic Hypoproteinemia. C. L. Yuile and R. E. Knutti, Rochester, N. Y.—p. 605.
Effect of Dietary Protein on Course of Nephrotoxic Nephritis in Rats. L. E. Farr and J. E. Smadel, New York.—p. 615.
*Prolonged Maintenance of Spirochetes and Filtrable Viruses in Frozen State. T. B. Turner and W. L. Fleming, Baltimore.—p. 629.
*Factors Influencing Survival of Spirochetes in Frozen State. T. B. Turner and Nancy L. Brayton, Baltimore.—p. 639.

Virulence of Spirochetes and Filtrable Viruses in Frozen State.—Turner and Fleming tested the virulence of five specimens of Spirochaeta pallida belonging to four different strains and seven specimens of Treponema pertenue belonging to five different strains after storage for approximately three years at a temperature of —78 C. With one exception each specimen contained actively motile spirochetes and all specimens were highly pathogenic for rabbits. Many other specimens of these spirochetes stored for shorter periods were also tested with similar results. Relapsing fever spirochetes tested after storage for from six months to one year showed active motility and were virulent for mice. Leptospira icterohaemorrhagiae was found to be actively motile after storage for five, six and ten months. The spirochete of rat bite fever, Spirillum minus, was virulent for mice after storage for one year. The virus of human influenza, PR8 strain, tested after storage for approximately three years was fatal to mice in essentially the same dilution as was the same lot of material before freezing. Similar results were obtained on testing the virus of meningopneumonitis after storage for three years. The virus of venereal lymphogranuloma was pathogenic for mice after storage for ten months.

Factors Influencing Survival of Frozen Spirochetes.—From a study of factors which influence the survival of spirochetes in the frozen state, Turner and Brayton conclude that the optimal conditions for the preservation of spirochetes, and probably other micro-organisms, in the frozen state are afforded by rapid cooling, storage at —78 C. and rapid thawing. These organisms are severely damaged by storage at temperatures of —20 C. or higher and by slow thawing.

Journal of Infectious Diseases, Chicago

65: 225-326 (Nov.-Dec.) 1939. Partial Index

*Value of Complement Fixation Test in Diagnosis of Psittacosis. K. F. Meyer and B. Eddie, San Francisco.—p. 225.
*Psittacosis in Importations of Psittacine Birds from the South American and Australian Continent. K. F. Meyer and B. Eddie, San Francisco.—p. 234.
Preservation of St. Louis Encephalitis Virus. E. H. Lennette and Margaret G. Smith, St. Louis.—p. 252.
Studies on Lactobacilli: II. Type-Specific Immunologic Reactions of Oral Strains. R. W. Harrison, Zdenka C. Zidek and Elizabeth S. Hemmens, Chicago.—p. 255.
Endocarditis Caused by Salmonella Suipestifer. C. T. Read, Cincinnati.—p. 263.
Therapeutic Properties of Sulfanilamide in Experimental Pneumococcic Infections. L. H. Schmidt and Carolyn Hilles, Cincinnati.—p. 273.
Effects of Neoarsphenamine and Sulfarsphenamine on Experimental Fusospirochetal Infection in Guinea Pigs. T. Rosebury, Genevieve Foley and F. L. Rights, New York.—p. 291.
Estimation of Purified Papilloma Virus Protein by Infectivity Measurements. W. R. Bryan and J. W. Beard, Durham, N. C.—p. 306.
Erysipeloid: Occurrence Among Veterinary Students. C. C. Morrill, Manhattan, Kan.—p. 322.

Complement Fixation Test in Psittacosis.—Meyer and Eddie discuss three importations of psittacine birds. Preliminary studies indicate that with the complement fixation test it may be possible to separate infected or recovered birds from healthy ones. Two of six serums collected from laboratory workers and bird inspectors gave repeatedly specific fixation reactions in dilutions of 1:8 to 1:16. These two workers, who have been intimately exposed to virus, have never had any illness suggestive of psittacosis except the usual colds. Subclinical silent infections have always been suspected. A man and wife permitted a sick bird to pick seeds from their lips. His blood serum gave a gradually increasing specific complement fixation reaction in the presence of psittacosis antigens (1:32). Her blood serum reacted in a dilution of 1:8 and rose within twenty days to 1:16. The exposure probably led in the man to a clinical and in the wife to a subclinical infection. A laboratory worker who contracted psittacosis and was desperately ill on the sixteenth day was given, both intravenously and intramuscularly, 125 cc. of convalescent serum with a neutralization index of less than 4.0. Within twenty-four hours his temperature dropped. The extensive pneumonic process began to clear four days after the administration of the serum. If any benefit is to be expected, it is important to use serum high in neutralizing antibodies. Hyperimmune serum prepared on goats is now available from the Hooper Foundation. The authors' conclusions are that: The complement fixation tests with cocto-antigens prepared from virulent mouse spleens or preferably Rivers-Li tissue cultures of the virus are invaluable aids in the early and late diagnosis of human psittacosis. Convalescent serum may shorten the course of the disease and should be tried. Highly potent goat serum may be equally effective.

Journal of Investigative Dermatology, Baltimore

2: 301-380 (Dec.) 1939

*Histaminase in Treatment of Urticaria and Atopic Dermatitis: Preliminary Report. C. W. Laymon and H. Cumming, Minneapolis.—p. 301.
Mitotic Index of Palmar and Plantar Epidermis in Response to Stimulation. J. M. Thuringer, Oklahoma City.—p. 313.
*Infectivity of Saliva in Early Syphilis. C. W. Barnett and G. V. Kulchar, San Francisco.—p. 327.
Blood Plasma Bromide Levels in Bromoderma. L. W. Kimberly, Iowa City.—p. 331.
Pathology of Lupus Erythematosus. H. Montgomery, Rochester, Minn.—p. 343.
Nails and Nail Changes: I. Investigation of Nail Lacquers and Their Components. H. Silver and B. Chiego, New York.—p. 361.

Histaminase for Urticaria.—Laymon and Cumming used histaminase in treating seventeen cases of urticaria, two of urticaria factitia and eight of atopic dermatitis. These cases had proved refractory to all other types of treatment. In the cases in which histaminase was administered, no other treatment was given. In most instances histaminase was given by intramus-

cular injections from one to three times a week as well as two or three tablets three times a day by mouth. There were no unfavorable reactions to the drug. Ten cases of urticaria were clinically cured. The duration of treatment varied from four days to three weeks. The average time for cure was 10.7 days. Two patients improved. One patient had urticaria for nine months and was 50 per cent improved after three weeks of treatment. Another patient had urticaria for several years and was 90 per cent improved after two months of treatment. The duration of the urticaria in the five cases in which improvement did not occur was from several weeks to three and a half years. There was no improvement in the two cases of autographism. No definite improvement was experienced in any of the cases of atopic dermatitis, although one month's trial of histaminase was given. From the results in their few cases the authors feel that histaminase is a useful adjunct to other therapeutic measures in urticaria. The nature of whatever antiallergic properties histaminase possesses are as yet not known. It may be that histamine is inactivated.

Infectivity of Saliva in Early Syphilis.—Saliva obtained directly from the parotid duct of seven patients with florid secondary syphilis was inoculated by Barnett and Kulchar into rabbits. The results were negative. The infectivity of saliva in patients with syphilis probably is due to contamination from intra-oral syphilitic lesions.

Journal of Urology, Baltimore

42: 917-1312 (Dec.) 1939

Incidence of Urinary Tract Obstruction in Renal Calculus Formation. J. C. Birdsall, Philadelphia.—p. 917.
Treatment for Unilateral and Bilateral, Staghorn Renal Calculi. J. T. Priestley, Rochester, Minn.—p. 933.
Resection of Rib in Renal Operations. E. Hess, Erie, Pa.—p. 943.
Hypertension's Challenge to Urology. S. W. Mulholland, Philadelphia.—p. 957.
Pyelonephritis in Children and Adults with Hypertension. A. E. Bothe, Philadelphia.—p. 969.
Nature of Renal Injury in Acute and Chronic Colon Bacillus Pyelonephritis in Relation to Hypertension: Combined Clinical and Pathologic Study. E. G. Crabtree and E. L. Prien, Boston.—p. 982.
Management of Ureter in Tuberculous Lesions of Kidney. T. L. Howard, Denver.—p. 1003.
Experimental Examination of Factors Causing Ureteral Dilatation of Pregnancy. G. van Wagenen and R. H. Jenkins, New Haven, Conn.—p. 1010.
Ureterovaginal Fistula: New Method of Reimplantation of Ureter into Bladder. J. F. Patton, St. Louis.—p. 1021.
Müllerian Duct Cysts: Report of Case. R. A. Hennessey, Memphis, Tenn.—p. 1042.
Renal Ectopia: Special Reference to Crossed Ectopia Without Fusion. A. Harris, Brooklyn.—p. 1051.
Plastic Surgery of Renal Pelvis. R. B. McIver, Jacksonville, Fla.—p. 1069.
Transurethral Resection in Treatment of Carcinoma of Prostate. W. N. Wishard Jr., H. G. Hamer and H. O. Mertz, Indianapolis.—p. 1088.
*Comparison of Results in Treatment of Prostatic Obstruction by Transurethral Resection and Prostatectomy. B. S. Abeshouse, Baltimore.—p. 1101.
Sexes and Hermaphroditism. J. F. McCahey, Philadelphia.—p. 1130.

Prostatic Obstruction.—A review of the results of 200 consecutive transurethral resections and 234 prostatectomies, Abeshouse states, shows that transurethral resection is the preferred operation for cases of median bar, solitary median lobe and solitary subcervical hypertrophies. It affords palliative relief for persistent suprapubic fistulas and for cases of carcinoma with obstructive symptoms and provides an excellent method of removing obstruction caused by contractions, nodules or tags following prostatectomy. The operation is not suitable in cases in which there are large bilobe or trilobe hypertrophies with marked intravesical or intra-urethral bulging. He finds that suprapubic prostatectomy is suitable for cases with marked enlargement of the prostate, especially for those accompanied by conditions of the bladder requiring operative treatment. Perineal prostatectomy is an ideal operation for treating large hypertrophies and small fibrotic glands with or without prostatic calculi. It is the only method offering a cure for early or concealed carcinoma. It requires greater operative skill and, when properly done, gives an equally good functional result. Mastery of the operative technic will dispel the fear of incontinence, impotence and fecal fistula. The most important lesson derived by the author from this study is that every patient with prostatic obstruction, irrespective of age, risk or type of obstruction, can be offered a reasonable hope of relief or even cure by the judicious selection of the proper type of operative procedure.

Kansas Medical Society Journal, Topeka

40: 449-492 (Nov.) 1939

Serum Treatment of Pneumonia. C. D. Head Jr., Washington, D. C.—p. 449.
Various Manifestations of Cerebral Arteriosclerosis. R. R. Grinker, Chicago.—p. 453.
Treatment of Carcinoma of Colon and Rectum. G. B. Kent and K. C. Sawyer, Denver.—p. 458.
*Acute Leukemia and Erythremia. M. Gerundo, Topeka.—p. 460.
Pentothal Sodium in Major Orthopedic Surgery. J. D. Bowen, Topeka.—p. 462.
Note on Subconvulsive Metrazol Therapy. E. Eisner, Osawatomie.—p. 463.

40: 493-536 (Dec.) 1939

Acute Hematogenous Osteomyelitis. P. C. Colonna, Oklahoma City.—p. 493.
Chronic Brucellosis as Major Cause of Neurasthenia. W. S. Horn, Fort Worth, Texas.—p. 498.
Urinary Tract Infections and Their Management. A. L. Stockwell, Kansas City, Mo.—p. 505.
Use of Barbiturates in Surgery: III. M. A. Walker, L. G. Allen, G. B. Ladd, Kansas City, and L. B. Mellott, Bonner Springs.—p. 511.
Pneumonia in Childhood. D. R. Davis, Emporia.—p. 512.
Psychosis Following Use of Marijuana: Report of Cases. H. C. Curtis, Wichita.—p. 515.

Acute Leukemia and Erythremia.—The virus theory of the leukemias, according to Gerundo, should receive more attention. There are enough observations to establish the hypothesis on solid ground. From a comparative study between tumors and leukemia it is evident that leukemias are not tumors nor similar to tumors in any way, since they are systemic diseases of tissue present in every part of the body. The atypical cells of cancer are never found in leukemia. The fact that cells show mitoses does not prove their malignant condition, since mitoses are always present in normal bone marrow. The mitoses are never atypical in leukemia, while they are almost always atypical in cancer. The leukemic infiltrations are not present where there is no potential hemopoietic tissue, as in the brain, and leukemic growths have not been found inside the nervous tissue. The author agrees with the conception of Ferrata and many other hematologists of a hyperplastic process of the hemopoietic organs. Such hyperplasia may be brought about by the action of a virus. A new conception is advanced to explain the phenomenon of leukopenia. The normal functional inhibition of the spleen on the growth and expulsion of the cells from the bone marrow and hemohistioblastic nests may be increased, producing a leukopenic state, and may suffer oscillations in capacity or rate, offering periods of complete aleukemia alternating with periods of marked leukocytosis.

Kentucky Medical Journal, Bowling Green

37: 559-600 (Dec.) 1939

Gallbladder and Biliary Passages. J. G. Sherrill, Louisville.—p. 560.
Preoperative and Postoperative Care in Diseases of Gallbladder and Gallducts. A. M. McKeithen, Louisville.—p. 565.
Some Practical Aspects of Children's Problems. W. K. Keller, Louisville.—p. 571.
Some Practical Thoughts About "Sinus Trouble." C. L. Woodbridge, Middlesboro.—p. 575.
Lead Poisoning in Infants and Children. J. J. Glaboff, Louisville.—p. 577.
Pathogenesis of Anemia: Anemia as Problem for the Neuropsychiatrist. H. Gordon, Louisville.—p. 580.
Prevention of Toxemia in Pregnancy. E. G. Heiselman, Newport.—p. 583.
*Intracranial Complications in 250 Cases of Surgical Mastoid Infections. A. L. Juers, Louisville.—p. 585.

Intracranial Complications of Surgical Mastoid Infections.—In 250 cases of surgical mastoiditis Juers encountered seventeen instances of intracranial complications (eight of petrositis, two of labyrinthitis, one of meningitis and six cerebral abscesses). He observed that the development in not a few of the intracranial complications could have been prevented if the patient had sought and been given earlier treatment for a potentially dangerous otic infection. As these cases were all seen before the era of sulfanilamide and its derivatives their management would at present be somewhat different, and more conservative surgical procedures could probably have been carried out in some of them. However, delay in the adequate surgical treatment of long-standing suppurative otitis media is still responsible for a large number of intracranial complications. While this is only too well known to otologists, some physicians and most laymen still regard a painless draining ear as a condition of no consequence. In addition to complete exenteration of all accessible mastoid cell structure, wide uncovering or decompression of the dura over a suspected intradural lesion rules out the presence of any extradural

pathologic change or it discloses a lead of infection through the dura or it allows room for swelling incidental to inflammation of the brain tissue, whether it is a localized meningitis or encephalitis or an abortive or a cerebral abscess. In the latter instance the decompression may enable the patient to survive until it is felt that the abscess is sufficiently walled off to permit surgical drainage through a clean area later. When relief of increased intracranial pressure is urgent, ventricular puncture should be considered. In the presence of an abscess, however, its use is attended by some danger. The author believes that intracranial complications would not have developed in five of the six fatal instances if earlier adequate surgical treatment had been given.

Missouri State Medical Assn. Journal, St. Louis

36: 471-514 (Dec.) 1939

Modern Trends in Pneumonia Therapy. R. O. Muether, St. Louis.—p. 471.
Surgical Aspects of Peptic Ulcer. W. H. Cole, Chicago.—p. 474.
Internal Fixation of Fractures of Neck of Femur. O. P. Hampton and J. E. Stewart, St. Louis.—p. 478.
Barbituric Acid Dermatitis with Photosensitization. G. V. Stryker, St. Louis.—p. 484.
Barbiturates Should Be Sold Only on Prescription. L. D. Cady, St. Louis.—p. 485.
Use of Barbiturates in Mental Hospitals. F. M. Grogan, St. Louis.—p. 487.
Side Effects of Barbiturate Sedation: Their Clinical Importance. P. Shelton, Kansas City.—p. 488.
Observations on Addiction to Barbituric Acid Derivatives. G. W. Robinson Jr., Kansas City.—p. 490.
*Barbituric Acid and Mental Health. G. W. Robinson Sr., Kansas City.—p. 493.
Some Undesirable Effects of Barbituric Acid and Its Derivatives. D. P. Johnson and I. L. Howell, St. Joseph.—p. 494.

37: 1-40 (Jan.) 1940

Present Day Trends in Treatment of Schizophrenia. W. Malamud and J. S. Gottlieb, Iowa City.—p. 1.
1937 St. Louis Epidemic of Encephalitis: Follow-Up Studies. A. B. Jones and G. S. Bonalis, St. Louis.—p. 5.
Traumatic Constrictive Pericarditis. E. E. Glenn, Springfield.—p. 7.
Modern Treatment of Pneumonia, with Discussion of Atypical Types. O. P. J. Falk, St. Louis.—p. 11.
The Crippled Child in Missouri. A. O'Reilly, St. Louis.—p. 14.
Prevention of Deformity in Childhood. C. H. Crego Jr., St. Louis.—p. 18.
Infantile Paralysis. W. J. Stewart, Columbia.—p. 20.
Cerebral Spastic Paralysis. F. D. Dickson, Kansas City.—p. 20.
Tuberculosis of Bones and Joints. J. A. Key, St. Louis.—p. 22.
Pyogenic Osteomyelitis. J. Kulowski, St. Joseph.—p. 24.
Deformity Following Accidental Injuries. R. M. Schauffler, Kansas City.—p. 25.

Barbituric Acid and Mental Health.—Robinson states that barbituric acid compounds do not promote but delay recovery from mental ill health. They further impair an already impaired brain nutrition. Sugar is the chief food of the brain for its activity. At the Neurological Hospital, where tolerance tests are done as a routine, in practically 100 per cent of all cases of psychoses, neuroses and alcoholic and narcotic addiction there is found an abnormally low ability to metabolize sugar. He suggests that insulin may be the answer, as it promotes sugar metabolism and if wisely administered, is an excellent sedative and hypnotic, and when given with dextrose it corrects states of disordered brain nutrition and disordered brain function. In the treatment of mental ill health barbituric acid compounds have a place, but only to meet emergencies and to relieve the patient temporarily of insomnia and mental distress.

New England Journal of Medicine, Boston

221: 959-1002 (Dec. 21) 1939

Medical Problems of the Day. R. Sleyster, Wauwatosa, Wis.—p. 959.
Further Experiences with Potassium Sulfocyanate Therapy in Hypertension. R. W. Robinson and J. P. O'Hare, Boston.—p. 964.
Biliary Surgery in the Aged: Study of 100 Consecutive Cases. T. B. Quigley, Boston.—p. 970.
*Treatment of Hypoprothrombinemia with Synthetic Vitamin K1: Report of Two Cases. H. A. Frank, A. Hurwitz and A. M. Seligman, Boston.—p. 975.
Surgical Treatment of Thyroid Disease. F. H. Lahey, Boston.—p. 978.

Synthetic Vitamin K_1 in Hypoprothrombinemia.—Frank and his collaborators used synthetic vitamin K_1 (2-methyl-3-phytyl-1,4-naphthoquinone) for the first time in two cases of obstructive jaundice. Before reporting the histories of these cases they say that no ill effect was observed in white mice, which were fed 10 mg. doses of the synthetic vitamin, nor in three human subjects each of whom was given 20 mg., together with bile, by mouth. For intravenous use the synthetic vitamin, which is an oil at room temperature, was given as a freshly prepared colloidal suspension in 10 per cent dextrose. This solution was prepared by dissolving 10 mg. of the oil in 2 or 3 cc. of absolute alcohol; this was boiled in order to sterilize the quinone and was slowly introduced, by means of a pipet, below the surface of a well agitated sterile solution of 1,000 cc. of 10 per cent dextrose in distilled water. The final solution was slightly opalescent. No particulate matter could be seen microscopically nor was there any tendency for the quinone to separate as an oil, even after standing for several days. The case histories are accompanied by charts recording the responses in terms of drops in prothrombin clotting time following oral and intravenous administration of synthetic vitamin K_1. In the first case a single dose of 10 mg. of synthetic vitamin K_1 given by mouth with bile on two occasions to a patient with an elevated prothrombin clotting time produced a drop which was maximal at the end of twenty-four hours. The time rose again in the next twenty-four hour period. The intravenous administration of the same dose resulted in a fall to normal levels within four hours. Twenty-four hours after injection, 10 mg. of the vitamin with bile was again given by mouth to prepare the patient for operation on the following day. At no time during the operation or in the postoperative period was abnormal bleeding noted. The prothrombin time remained within normal range, without further administration of the vitamin, until death on the third postoperative day. The results obtained in this case suggest that oral doses repeated at twelve hour intervals might have maintained the prothrombin level within normal limits. In case 2 a single intravenous dose of 10 mg. of synthetic vitamin K_1 resulted in a fall in prothrombin clotting time to a normal level within four hours. The clotting time remained within a normal range for six days after injection, despite the fact that an operation was performed during this period.

New Jersey Medical Society Journal, Trenton

36: 695-758 (Dec.) 1939

Tribute to Dr. Edward J. Ill, "First President, Benefactor and Trustee of the Academy of Medicine of Northern New Jersey," on Establishment of "The Edward J. Ill Award". W. P. Eagleton, Newark.—p. 699.
Why Cancer Should Be of Interest to the General Practitioner. W. G. Herrman, Asbury Park.—p. 705.
Fetal Respiration and Its Relation to Asphyxia, Atelectasis and Pneumonia of Newborn. F. F. Snyder, Chicago.—p. 711.
Differentiation of Tuberculous and Nontuberculous Pulmonary Infections. A. E. Jaffin, Jersey City.—p. 714.
The Doctor Shares a Responsibility in Adoptions: Adoption of Children: Article Number Two. Ellen C. Potter, Trenton.—p. 718.
Technic of Gastroscopy and Indications for Its Use. A. J. V. Klein, Newark.—p. 720.

New Orleans Medical and Surgical Journal

93: 289-348 (Dec.) 1939

Convalescent Serum in Prevention and Treatment of Common Contagious Diseases in Childhood. R. T. Lucas, Shreveport, La.—p. 289.
Radiology versus Pseudoradiology. S. Hatchette, Lake Charles, La.—p. 295.
Roentgenologic Diagnosis of Certain Appendicular Conditions. A. Mayoral, New Orleans.—p. 300.
Danger of Echelics: Report of Case of Cinchonism. H. J. Dauterive and O. E. Dalton, New Iberia, La.—p. 302.
Hysterosalpingography: Valuable Adjunct in Gynecologic Diagnosis. T. B. Sellers, J. T. Sanders and J. J. Young, New Orleans.—p. 304.
Acute Lymphocytic Choriomeningitis: Report of Twelve Cases from Louisiana. C. J. Tripoli and D. E. Fader, New Orleans.—p. 308.
Symptoms, Diagnosis and Treatment of Pellagra, with Special Reference to Use of Nicotinic Acid. J. P. Davis, Lake Providence, La.—p. 315.
Public Health Aspects of Syphilitic Patient. A. L. Adam, Shreveport, La.—p. 322.

New York State Journal of Medicine, New York

39: 2235-2310 (Dec. 15) 1939

Prostatic Obstruction: Medical and Surgical Aspects. H. H. Young, Baltimore.—p. 2241.
Periarteritis Nodosa: Report of Three Cases Diagnosed Clinically and Confirmed by Necropsy in Two Instances and by Biopsy in Third Case. E. Appelbaum and M. Kalkstein, New York.—p. 2253.
Malignant Tumors in Children. E. Kellert, Schenectady.—p. 2259.
*Extrarectal Metastatic Malignancy Simulating Primary Carcinoma of Rectum. H. E. Bacon, Philadelphia.—p. 2267.
Diabetic Experiments. F. M. Allen, New York.—p. 2274.
New York State Program for Cancer Control. E. S. Godfrey Jr., Albany.—p. 2280.

Extrarectal Malignant Metastasis Simulating Primary Carcinoma.—Bacon reports twenty-two proved cases of upper abdominal and mammary malignant neoplasms with metastasis to the pelvic peritoneal pouch. Of these, fifteen occurred in

men and seven in women; the average age was 54.5 years. Whereas the condition was advanced in all the cases in the series, it must be realized that such metastasis may occur early and be the only site of invasion. The condition is of importance in that it is not extremely rare and the symptoms may not direct attention to the primary site, because the extrarectal process may be incorrectly diagnosed and a radical extirpation performed. The primary growths were found most frequently in the stomach. Twenty-one of the tumors were adenocarcinomas and one was a sarcoma. Although misinterpreted in many instances, the rectal growths were palpated. This can be attributed to the fact that the more recent graduates have learned that no physical examination is ever complete without a thorough digital and proctosigmoidoscopic examination.

Northwest Medicine, Seattle

38: 455-492 (Dec.) 1939

Approval of Laboratories. W. Levin, Portland, Ore.—p. 458.
Perineal Pruritus an Allergic Manifestation? B. R. Brooke, Portland, Ore.—p. 462.
Pneumorectotomy: Case Report. A. H. Winkel and E. A. Rogge, Seattle.—p. 465.
Simple Methods for Studying Skin Factors in Liver Extract: Clinical Observations on Cases of Acne Vulgaris. W. Marshall, Appleton, Wis.—p. 467.
Opacities of Cornea and Their Treatment. F. A. Kiehle, Portland, Ore.—p. 469.
Acute Otitis Media in the Newborn: Report of Four Cases. L. A. Parsell, Spokane, Wash.—p. 471.
Inversion of Uterus: Report of Case. R. M. McKeown, Marshfield, Ore.—p. 473.
Hemorrhage in Pulmonary Tuberculosis: Dental Focal Infection as Principal Cause. C. H. Sprague, Boise, Idaho.—p. 475.

Ohio State Medical Journal, Columbus

35: 1265-1368 (Dec.) 1939

Present Status of Pertussis Immunization. J. G. Kramer, Akron.—p. 1281.
Lobectomy in Treatment of Bronchiectasis. G. M. Curtis, Columbus, and H. G. Knierim, Detroit.—p. 1286.
Development of Child Psychiatry as a Neuropsychiatric Specialty. O. B. Markey, Cleveland.—p. 1290.
Management of Hyperphoria. M. P. Motto, Cleveland.—p. 1295.
Use of Skin Tests in Diagnosis and Treatment of Rheumatoid Arthritis. J. R. Reeves, Columbus.—p. 1299.
Usefulness in Clinical Practice of Knowledge of Ovulation Date. J. C. Placak, Cleveland.—p. 1302.
Acute Traumatic Subdural Hematoma: Recognition and Management. S. W. Weaver, Youngstown.—p. 1305.
Tuberculous Endometritis: Report of Case. H. M. Wiley, Cincinnati.—p. 1310.
Clinical Experience in Skin Testing with Homologous Protein for Determination of Active Tuberculosis. P. T. Knies, Columbus.—p. 1313.
Glomus Tumor: Report of Two Cases. P. R. Kline, New York; M. Brody, Canton, and E. R. Brody, New York.—p. 1317.
*Acquired Atelectasis. W. H. Maddox, Wauseon.—p. 1320.

Acquired Atelectasis.—Maddox points out that massive atelectasis may be caused in traumatic cases by contraction of the bronchial musculature through shock to the pulmonary nerves (vagus plus sympathetic). This causes the smallest bronchioles to collapse and their walls to adhere, much of the air in the alveoli and bronchioles having been forced out by strong contraction of the muscles of expiration and by the narrowing of the bronchi and bronchioles by contraction of the intrinsic bronchial muscles aided by contraction of elastic tissue. In some cases of postoperative collapse, bronchial plugs are present in the main or smaller bronchi. When such plugs are not present, atelectasis may occur from stasis in the pulmonary arteries. This begins in the smallest branches and is favored by impairment of the general circulation and by interference with the amplitude of respiratory movements. This in turn favors reduction in vital capacity and other factors (high diaphragm with compression of the bases, fear of pain, sedatives, the maintenance of one position and the like). All patients with postoperative pulmonary symptoms should have the benefit of repeated roentgenography.

Rhode Island Medical Journal, Providence

22: 189-202 (Dec.) 1939

Anorexia Nervosa. G. H. Alexander, Providence.—p. 189.

Rocky Mountain Medical Journal, Denver

36: 837-942 (Dec.) 1939

What Price Depression? R. Sleyster, Wauwatosa, Wis.—p. 854.
How Contagious Diseases Are Spread. I. A. Abt, Chicago.—p. 860.
Infections of the Neck. C. J. Baumgartner, Los Angeles.—p. 865.
Amebiasis. A. J. Chisholm, Denver.—p. 870.
Annual Report of the President: Colorado Hospital Association. J. R. Mulroy, Denver.—p. 878.

Southern Surgeon, Atlanta, Ga.

8: 445-526 (Dec.) 1939

Indications for Hysterectomy. I. Abell and I. Abell Jr., Louisville, Ky.—p. 445.
Application of Electrically Neutral Metal in Fractures. C. S. Venable, San Antonio, Texas.—p. 456.
Optimal Period for Delay of Operation Following Appendicitis Complications. H. Mahorner and R. Vincent, New Orleans.—p. 462.
Vesicovaginal Fistula: Suprapubic Approach. R. W. McKay, Charlotte, N. C.—p. 472.
Immediate versus Delayed Treatment of Acute Appendicitis with Rupture: Statistical Study. J. L. McGehee, Memphis, Tenn.—p. 480.
Management of Salpingitis. W. R. Cooke, Galveston, Texas.—p. 488.
Open Treatment of Peritonitis Secondary to Appendicitis. H. A. Gamble, Greenville, Miss.—p. 495.
Anal Carcinoma in Situ: Report of Three Cases. P. M. Vickers, R. J. Jackman and J. R. McDonald, Rochester, Minn.—p. 503.
Lifeguards of Surgery. A. L. Lockwood, Toronto.—p. 508.

Surgery, St. Louis

6: 817-994 (Dec.) 1939. Partial Index

Acute Traumatic Dislocation of Tendon of Long Head of Biceps Brachii: Report of Six Cases with Operative Findings. L. C. Abbott and J. B. deC. M. Saunders, San Francisco.—p. 817.
Blind Method of Nailing Fractured Femoral Necks. J. P. Cole, Buffalo.—p. 841.
*Use of Zinc Peroxide in Treatment of Diabetic Gangrene of Lower Extremities. F. L. Meleney, New York.—p. 845.
Total Cystectomy for Cancer: Critical Review. F. Hinman and D. Smith, San Francisco.—p. 851.
Choledochojejunostomy: Experimental Study After Resection of Duodenum and Seven Eighths of Stomach. W. H. Bachrach and S. J. Fogelson, Chicago.—p. 882.
Effect of Gallbladder Disease on Electrocardiogram. M. M. Weiss and J. E. Hamilton, Louisville, Ky.—p. 893.
Effect of Trauma to Liver on Plasma Prothrombin: Experimental Study. J. W. Lord Jr., New York.—p. 896.
*Effect of Hepatectomy on Plasma Prothrombin and Utilization of Vitamin K. W. D. Andrus, J. W. Lord Jr. and R. A. Moore, New York.—p. 899.
Polypoid Disease of Colon: Anatomic Measurements of Colon Including Description of Colonoscope. R. F. Hedin, Red Wing, Minn.—p. 909.
New Technic for Cutting Skin Grafts; Including Description of New Instruments. E. J. Poth, San Francisco.—p. 935.

Zinc Peroxide in Treatment of Diabetic Gangrene.—Diluted solution of sodium hypochlorite and other hypochlorites do not act favorably on tissues which have impaired circulation, as in diabetic gangrene of the extremities. They inhibit the development of granulation tissue and thus delay the reparative process. Zinc peroxide, Meleney states, markedly inhibits the growth of the hemolytic streptococci and all anaerobic bacteria, including the organisms causing gas gangrene and the anaerobic streptococci. It neutralizes or inactivates the toxins formed by these organisms and at the same time encourages the reparative process by the stimulation of granulation tissue. Zinc peroxide, which is a white powder, should be suspended in sterile distilled water and applied to every part of the wound surface. The wound should then be covered with fine meshed gauze soaked in the same material. This should be covered with compresses saturated with sterile distilled water and these compresses in turn covered with petrolatum gauze or some other impermeable material to prevent evaporation. The dressing should be changed every twenty-four hours, the old material irrigated off, and a new dressing applied. It is important to use material which has been proved to be effective in the production of oxygen, and it is essential that adequate contact be obtained between the zinc peroxide suspension and every part of the wound surface. The use of sulfanilamide is indicated in addition to the zinc peroxide if hemolytic streptococci are present. If hemolytic streptococci and anaerobic organisms are present at the site of amputation, zinc peroxide should be used as a prophylactic to prevent the development of infection in the stump, or if infection has developed it should be used as early as possible to control it. If reamputation is necessary, it should be used immediately to prevent infection in the second operative site.

Hepatectomy, Plasma Prothrombin and Vitamin K.—Andrus and his associates performed complete hepatectomy in experiments with six dogs. They say that the precipitate and continuous fall in the plasma prothrombin which followed hepatectomy is evidence that the liver, under normal conditions, is concerned in the continuous formation of prothrombin. Further evidence that the liver is the organ which, in the presence of vitamin K, forms prothrombin is that instillation of a large amount of this vitamin into the duodenum during operation fails to alter the typical decreasing curve of the plasma prothrombin after hepatectomy.

FOREIGN

An asterisk (*) before a title indicates that the article is abstracted below. Single case reports and trials of new drugs are usually omitted.

British Medical Journal, London

2: 1127-1172 (Dec. 9) 1939

Carcinoma of Stomach. J. Walton.—p. 1127.
*Lymphatic Leukemia: Value of Sternal Puncture in Diagnosis of Atypical Cases. M. C. G. Israëls.—p. 1132.
Spread of Retroperitoneal Effusions Arising in Renal Regions. G. A. G. Mitchell.—p. 1134.
Advantages and Disadvantages of Endotracheal Anesthesia. Rosalind M. P. Milne and J. R. Mackenzie.—p. 1136.
Plea for Better Endoscopic Training. G. E. Martin.—p. 1138.

Lymphatic Leukemia.—Israëls cites five cases in which some of the classic signs of lymphatic leukemia were missing but the clue to an otherwise open diagnosis was provided by sternal marrow punctures. The sternal marrow shows a lymphocytosis even when the clinical signs and the peripheral blood pictures are atypical. This lymphocytosis is strong evidence for the diagnosis of lymphatic leukemia, as it is not usually found in other conditions.

Journal of Hygiene, London

39: 597-724 (Nov.) 1939

Pituitary Extracts and Virus of Foot and Mouth Disease: Effect on Virus of Certain Chemical Methods Employed in Their Preparation. L. A. Galloway.—p. 597.
Cross Immunity Experiments in Monkeys Between Variola, Alastrim and Vaccinia. E. S. Horgan and M. A. Haseeb.—p. 615.
Vitamin B: Excretion on Varied Intake. Margaret D. Wright and Audrey Z. Baker.—p. 638.
Some Effects of Prolonged Vitamin E Deficiency in Rat. A. J. P. Martin and T. Moore.—p. 643.
Value of Sodium Dextrotartrate Fermentation Test in Differentiation of Salmonella Organisms. S. W. Challinor and A. J. Rhodes.—p. 651.
Significance of Occurrence of Bacteriophage for Dysentery Bacilli in Water Supplies. A. J. Rhodes and M. Ludlam.—p. 658.
Some Factors Influencing Spread of Scarlet Fever in an Institution. E. V. Keogh, I. Macdonald, Joan Battle, R. T. Simons and S. Williams.—p. 664.
*Sensitization to Flour and Flour Illnesses Among Flour Workers. H. A. E. van Dishoeck and D. J. Roux.—p. 674.
Immunity Following Intracutaneous and Subcutaneous Vaccination with Elementary Body Suspensions of Vaccinia. R. G. Henderson and D. McClean.—p. 680.
Control of Air-Borne Bacteria and Fungus Spores by Means of Aerosols. R. J. V. Pulvertaft and J. W. Walker.—p. 696.
Influence of Emulsions of Olive Oil on Biologic Actions of Alkaloids. G. N. Myers.—p. 705.

Sensitization of Bakers to Flour.—Van Dishoeck and Roux estimated the occurrence of asthma, vasomotor rhinitis and eczema due to sensitization to wheat, rye, oat, corn or/and other flour among 262 unselected bakers and millers. All these workers were tested with the scratch method. A large number of persons were also tested for sensitiveness to ammonium persulfate. Sixty-six (25 per cent) of the bakers and millers were sensitive to flour. Among the 196 flour workers with negative reactions, ailments of the respiratory tract or eczema were exceptionally rare. On the other hand nearly all the sixty-six workers with positive cutaneous reactions were suffering or had suffered from one or more flour illnesses. Omitting exceptional cases, it seems that the flour illnesses, vasomotor rhinitis, asthma and eczema, are usually associated with positive cutaneous reactions to flour proteins. Of the sixty-six hypersensitive persons fifty-two gave positive and fourteen negative reactions to wheat flour. These fourteen reactors were sensitive only to oat or to rye flour. If investigations had been restricted to wheat only negative results would have been obtained in 21 per cent of the cases of flour illness. Hypersensitiveness to flour is most probably an inhalation allergy like that due to dust or pollen. From the personal histories of the sensitized flour workers, symptoms had developed in 37 per cent within the first five years of employment and within ten years in the remainder. Bakers, in small bakeries especially, were sensitized when still young. Only ten of the thirty patients with active eczema tested gave a positive reaction to ammonium persulfate. Therefore ammonium persulfate does not appear to be the primary cause in every case of flour hypersensitiveness, as suggested by some workers. On the contrary, the authors think that sensitization to flour is the main cause of the flour illnesses, including flour eczema, and on this ground in some cases an epithelial persulfate hypersensitiveness also develops. In all their cases of persulfate hypersensitiveness a strong positive flour hypersensitiveness was present. The observations suggest that improvement in the hygienic conditions in bakeries, especially in the small ones, is desirable and that early allergic examinations of the bakers might be useful in detecting impending illnesses due to flour. Desensitization with the extremely potent proteose constituent of wheat, with encouraging results, has been tried.

Lancet, London

2: 1205-1252 (Dec. 9) 1939

The Apposable Thumb. W. Langdon-Brown.—p. 1205.
*Systolic Clicks Due to Left-Sided Pneumothorax. J. G. Scadding and P. Wood.—p. 1208.
Tragedy of Footwear. E. A. Lindsay.—p. 1211.
Antistreptolysin S Titers in Rheumatic Fever. E. W. Todd, A. F. Coburn and A. B. Hill.—p. 1213.
Exophthalmos in Graves's Disease Despite Sympathetic Paralysis. W. R. Brain.—p. 1217.
Preservation of Stored Blood. M. Maizels and N. Whittaker.—p. 1219.
Pernicious Anemia in Child. W. L. Templeton.—p. 1221.

Systolic Clicks Due to Left-Sided Pneumothorax.—Scadding and Wood, in the past two years, have observed cases which presented extra sounds during the cardiac cycle, in association with shallow left-sided spontaneous pneumothorax. The extra sounds were of a clicking character and were usually best heard in the region of the apex beat. The sounds were usually single clicks and then occurred in the systolic part of the cycle; occasionally a more complex extra sound during systole or an additional less prominent diastolic sound of similar character might be heard. The systolic clicking element was the most striking. The sounds varied both in intensity and in timing with small changes in posture and were at times loud enough to be audible to the patient and to bystanders. The pneumothorax was of the benign nontuberculous type and was absorbed without incident, the sound disappearing when the pneumothorax was absorbed or earlier. The clicks have not been heard in association with larger pneumothoraces. In four cases of exudative pulmonary tuberculosis of limited extent, which were to be treated by left-sided artificial pneumothorax, the induction was performed with a smaller volume of air than usual and careful observation made during and after induction for the occurrence of extra sounds. In two of the four cases loud systolic clicks were produced. In the other two, though soft extra sounds were transiently audible on careful auscultation in various postures, they were not striking enough to be comparable with the sounds heard in the cases of spontaneous pneumothorax. The authors review the two cases of artificial pneumothorax in which the loud systolic clicks were heard. The sounds produced in these cases were similar in quality and timing to those observed in the cases of spontaneous pneumothorax. In both cases the introduction of more air rapidly caused the extra sounds to disappear. The authors point out that previously recorded cases in which transient loud noises synchronous with the heart beat were associated with the sudden onset of pain and dyspnea and with the appearance of air in abnormal situations in the tissues seem to fall into two distinct groups: (1) sounds in association with left-sided pneumothorax and (2) sounds in association with mediastinal emphysema. When the sounds were crunching, churning or crackling and might be heard as well in diastole as in systole, interstitial emphysema of the mediastinum was constantly present. The mechanism of production of the sounds in mediastinal emphysema is obvious. In shallow left-sided pneumothorax, the authors think the sounds are made by the forcible separation of the visceral and parietal pleurae during cardiac systole, when the small air bubble in the pleura is in such a position that it can be moved by the cardiac pulsations—a mechanism similar to that of production of the consonant t. This hypothesis explains the presence of the sound only with small pneumothoraces, its disappearance if more air is introduced, and its extreme sensitivity to changes in posture. Several other hypotheses have been advanced to explain these sounds. Regarding the clinical importance of the extra sounds, the authors say that the syndrome may be most alarming to the patient and to his relations and may mislead the physician into making a diagnosis carrying a grave prognosis; for, unless the peculiar nature of the added sound suggests the advisability of x-ray examination, the spontaneous pneumothorax is likely to remain undiagnosed. The syndrome is of interest also in relation to systolic gallop rhythm.

Proceedings of Royal Society of Medicine, London

32: 1551-1722 (Oct.) 1939

Observations on Epidemic of Cerebrospinal Meningitis in Cyprus and Record of Prophylactic Experiment. I. H. Maclean and C. E. Bevan. —p. 1551.
Pelvic Osteo-Arthropathy of Pregnancy. J. Young.—p. 1591.
Effect of Inclination of Pelvic Brim and Shape and Inclination of Upper Sacrum on Passage of Head Through Upper Pelvis. P. Malpas and C. J. K. Hamilton.—p. 1597.
Bilateral Keratitis and Cyclitis Due to Filaria Infection in European from Kenya: Case. A. H. Levy.—p. 1620.
Ascertainment of Deafness and Ear Disease in Children. T. C. Lonie. —p. 1632.
Position of Portmann Operation in Relation to Labyrinthine Vertigo. E. M. Wordman.—p. 1642.
*Histologic Changes in Temporal Bones of Case of Ménière's Disease. C. S. Hallpike and A. J. Wright.—p. 1646.
Discussion on Prolapsed Intervertebral Disks. J. G. Love.—p. 1697.

Histologic Changes in Ménière's Disease.—In a previous article Hallpike and Cairns gave a description of the pathologic observations in the temporal bones of two typical subjects of Ménière's syndrome. Certain peculiar changes were disclosed in the labyrinth and the changes were considered to support the view that the disorder was due to specific disease of the labyrinth itself. The pathologic changes of the temporal bones of a third case, examined by Hallpike and Wright, are reported. On examination the tympanic membranes were normal, and hearing distance for the conversational voice was apparently normal on the right side but on the left side it was reduced to 6 feet. Bone conduction for a tuning fork was diminished on the left side and the audiogram showed a considerable high tone loss on the left side with normal hearing on the right. The tonsils were enlarged and grossly infected, and clinical and x-ray examination showed a bilateral antral sinusitis. The tonsils were removed and an intranasal opening was made into the antrum below the inferior turbinal on either side and in addition a limited submucous resection of the septum was performed to facilitate antral drainage. The patient eventually died, five weeks after the operation, as a result of repeated secondary hemorrhages. In the previous report the view was advanced that the primary mechanism of the disease was an obstructive distention of the endolymph system. This distention occurred in the present case. The peculiar nature of the changes makes it reasonable to regard them as constituting the essential morbid anatomy of a specific disease of the labyrinth. The relatively slight degree of the endolymphatic distention in the present instance and the absence of changes in Corti's organ or in the stria vascularis such as were disclosed in both of the cases previously reported are considered in greater detail. In both particulars it seems likely that the principal factor involved was the short duration of the disease. Six months elapsed between the first attack of vertigo and death. With regard to the extent of the endolymphatic distention, in the two previous cases the blocking of the scala vestibuli by the distended scala media was complete and this, it was suggested, was an essential part of the mechanism of the vertiginous attacks. This suggestion does not appear to be supported by the finding in the present subject of an incomplete distention of Reissner's membrane. Nevertheless the possibility exists that the distention found might well be subject to a rapid increase to the point of complete obliteration of the scala vestibuli and that such an increase might occur within a prodromal period of some hours preceding an attack of vertigo. This possibility is supported by the finding of marked folds in Reissner's membrane and for this reason it does not seem necessary at present to discard the suggestion in question. As to the absence in the present subject of changes in Corti's organ or in the stria vascularis, in addition to the minor character of the microscopic changes which would be likely to occur in the early stages of the disease, account must also be taken of a certain transience of these changes which would well accord with the fluctuating character of the deafness emphasized by Crowe. Such transience on the part of the changes in Corti's organ introduces a chance factor which would play an important part in determining the results of microscopic examination. Should this factor operate unfavorably then it seems likely that the minor changes which may be present in Corti's organ in the early stages of the disease will always defy microscopic demonstration, particularly when, as in the present instance, they are further obscured by the artefacts of postmortem degeneration.

Archives des Maladies du Cœur, Paris

32: 849-944 (Sept.-Oct.) 1939

Lack of Ventricular Subordination in Partial or Atypical Auriculoventricular Blocks: Aspects and Significance. R. Froment, R. Masson and A. Gonin.—p. 849.
*Primary Arterial Hypertension (Benign Nephro-Angiosclerosis) Treated by Complete Enervation of Left Kidney and Section of Splanchnic with Concomitant Adrenalectomy: State of Renal Function After Ten Months. R. Fontaine and G. Mayer.—p. 860.
Hypovitaminosis B_1 and Cardiopathies: III. Aggravating Action of Deficiency in Vitamin B_1 on Cardiac Disturbances of Patients with Exophthalmic Goiter and Diabetes and on Banal Cardiopathies. G. Bickel.—p. 869.
Action of Theophylline with Ethylenediamine on Intra-Arterial Pressure of Man. J. Lequime and J. van Heerswynghels.—p. 879.
Ventricular Tachycardia and Partial Block in Course of Myocardial Infarct. P. Szekely.—p. 887.
Investigations on Quantity of Circulating Water in Blood Plasma. J. Fliederbaum.—p. 893.

Surgical Treatment of Arterial Hypertension.—Fontaine and Mayer review the clinical history of a woman aged 54 who had had hypertension for more than ten years and who had had already three cerebral attacks with paralysis aphasia and other symptoms. The treatment consisted of adrenalectomy, splanchniectomy, with high lumbar sympathectomy, all associated with denervation of the renal pedicle, with ablation of the aorticorenal ganglion and completed by decapsulation. The operation was made only on the left side. After the operation the arterial tension decreased, but later there was again a progressive increase up to the preoperative figures. However, the functional amelioration persisted at the end of ten months. The benefit which the patient derived from the operation is manifested especially by the suppression of certain disagreeable subjective symptoms, such as headaches, giddiness and murmurs. Furthermore, the paroxystic hypertensive crises, which represent such a grave danger for patients with permanent hypertension, disappeared after the operation.

Presse Médicale, Paris

47: 1569-1584 (Nov. 25-29) 1939

*Differential Diagnosis of Arterial Embolisms of Members. P. Funck-Brentano.—p. 1569.
Influence of Dehydration in Surgery. J. Battin.—p. 1572.
Present Condition of Tuberculous Patients Surviving from Last War. H. Mollard.—p. 1574.
Action Mechanism of Cardiotonics. J. Stefl and V. Kolar.—p. 1575.

Differential Diagnosis of Arterial Embolism.—Funck-Brentano says that in the presence of an acute arterial occlusion an early etiologic diagnosis is of vital importance, because only extreme rapidity of diagnosis permits the proper treatment, which alone makes it possible in most cases to preserve the function, prevent gangrene and avoid amputation and the resulting cardiac decompensation. Reviewing the clinical symptoms that are accepted as typical he mentions among the subjective signs the brutal pain, which is at first localized and then spreads toward the distal portion of the member; also the sensation of cold and the numbness in the member. Of the objective signs he mentions disappearance of the pulsation, discoloration of the skin, local cutaneous coolness, diminution or abolishment of the reflexes, abolition of movements and perturbation in the sensibility. He also stresses oscillometry as an important diagnostic aid. However, in spite of this wealth of symptoms the differential diagnosis of arterial embolism remains extremely difficult, and the author does not share the optimistic assurance of many surgeons who regard the diagnosis as easy. To explain his stand he reviews the following points: 1. Examinations like oscillometry may lead to errors. 2. The picture of arterial embolism may differ greatly from that regarded as classic. 3. The classic picture of arterial embolism can be realized by lesions other than embolism. In this connection the author points out that phlebitis and arteritis may exhibit symptoms similar to arterial embolism. 4. The anamnestic information does not always suffice to affirm the origin of arterial occlusion.

Revue Belge des Sciences Médicales, Louvain

11: 297-336 (Aug.-Sept.) 1939

Hematologic Investigations on Medullary Biopsy. W. de Weerdt.—p. 297.
*Antithyroid Action of Estrogen in Clinic. J. Lederer.—p. 326.

Antithyroid Action of Estrogen.—Lederer points out that the frequent appearance of goiter in women at puberty, gestation, lactation or the menopause directed attention to the relation between the ovary and the thyroid. Furthermore it has been

observed that, in exophthalmic goiter as well as in myxedema, disturbances of menstruation are likely to occur. Although the existence of a relation between ovaries and thyroid cannot be doubted, its mechanism is complex and abounds in contradictions. Following a brief review on the effect of injections of estrogen on the activity of the thyroid, the author reviews the history of a woman aged 36 who had been well until ten years before, when an exophthalmic goiter developed which failed to yield to medical treatment and later subtotal thyroidectomy was performed. The patient improved so that she could resume her normal activities. Several years later adnexitis developed and total hysterectomy became necessary with bilateral ovariectomy. Following this the symptoms of exophthalmic goiter recurred. Various measures such as roentgen therapy, compound solution of iodine, diiodotyrosine and even estrogen in a quantity of 10,000 units a week failed to improve the symptoms of exophthalmic goiter. Then it was decided to try estrogen alone in large doses. The individual dose was 5 mg. During the first week 25 mg. was given, during the second and third weeks 20 mg. each, during the fourth week 15 mg., during the fifth week 10 mg., and during the sixth to eighteenth week 5 mg. each. This treatment produced a rapid improvement. The author admits that it would go too far to conclude from this case that estrogen is the future treatment of hyperthyroidism. However, in the cases in which ovarian and hypophysial dysfunction are involved, estrogen might be helpful.

Dermatologica, Basel

80: 65-128 (Aug.) 1939. Partial Index

*Treatment of Psoriasis with Diet Deficient in Potassium and with Extract of Adrenal Cortex. C. K. Incedayi and Berta Ottenstein.—p. 65.
Disappearance of Generalized Vitiligo After Antisyphilitic Cure with Irradiations with Natural Sunlight. A. Ackermann.—p. 81.
Is There a "Genuine" Psoriasis Carcinoma? J. Burgener.—p. 86.
Tularemia. P. Robert.—p. 98.

Treatment of Psoriasis.—Incedayi and Ottenstein investigated the cholesterol metabolism in three cases of psoriasis. In view of the fact that recent opinions localize the disturbance in the lipoid metabolism not only in the liver but also in the adrenals, the authors decided to try treatment with a preparation of adrenal cortex in combination with a diet that was deficient in potassium. The effect was surprisingly favorable in all three cases. However, no conclusions concerning the etiology of psoriasis can be deduced from these observations.

Schweizerische medizinische Wochenschrift, Basel

69: 1197-1216 (Nov. 25) 1939. Partial Index

Electrical Injuries of Oral Cavity. E. Oppikofer.—p. 1197.
Benign Pharyngeal Angina with Splenic Tumor Caused by Bacillus Fusiliformis. A. Grumbach, E. Liebmann and H. Schindler.—p. 1199.
Stages of Reaction in Course of Rheumatic Infection. E. Trauh.—p. 1200.
*Premenstrual Salivary Syndrome. W. Racine.—p. 1204.

Premenstrual Salivary Syndrome.—Racine presents brief histories of four women who observed tumefaction of their salivary glands four or five days before the onset of menstruation. The swelling subsided with the onset of the flow. In one woman the two submaxillary glands were swollen, in another one the two parotid glands and in the other two one parotid and one submaxillary gland. Simultaneously the women had an abnormal swelling of the breasts. It is noteworthy that all the women had undergone gynecologic interventions (unilateral ovariectomy, curettage or ligation of the tubes). The premenstrual appearance of the swelling of the salivary glands suggests a connection with the ovarian function and the author reasons that an insufficiency of the corpus luteum hormone is responsible. Consequently he decided to give injections of progesterone every other day during the ten days preceding the onset of menstruation. These injections prevented the appearance of the tumefaction of the salivary glands as well as the swelling of the breasts. One of the women was given the treatment four times with the result that for two years now the salivary symptom has not reappeared. Two other patients have to repeat the treatment during every premenstrual period, otherwise the salivary symptom returns. Although the treatment of the fourth patient prevented the appearance of the salivary symptom, the treatment was contraindicated because it diminished the diuresis and augmented the edemas; this patient had chronic nephritis.

Accademia Medica, Genoa

54: 517-584 (June) 1939. Partial Index

Pathology from Abnormalities of Veins of Dura Mater: Clinical and Operative Study. O. Balduzzi, U. Sacchi and T. Lazzeri.—p. 522.
*Glycemia and Glycorrhachia After Insulin Loading in Diabetes. G. Vitale.—p. 537.

Glycorrhachia After Insulin Loading in Diabetes.—Vitale followed the behavior of dextrose in the blood and the cerebrospinal fluid of ten patients who were suffering from diabetes mellitus. The repeated determinations were done by the Hagedorn-Jensen method, before and after administration of a subcutaneous injection of 40 units of Richter insulin. The author found that the amount of dextrose in the cerebrospinal fluid of diabetic patients is increased in comparison with normal figures (0.001 and 0.0005 Gm. of sugar respectively to each hundred cubic centimeters of cerebrospinal fluid). Dextrose in both the cerebrospinal fluid and the blood diminish after administration of the injection of insulin. Diminution begins simultaneously. It takes place rapidly and in moderate figures in the blood and slowly and in large figures in the cerebrospinal fluid. The lowest figures of dextrose in the blood appear two or three hours after injection of the insulin, after which glycemia increases again. The lowest figures of dextrose in the cerebrospinal fluid appear five or six hours after the injection and when glycemia has been for several hours near the figures existing before the injection. In one of the cases a comatose condition, lasting about twenty minutes and spontaneously subsiding, developed during the few minutes that glycorrhachia was at the lowest figures (almost an absence of dextrose in the cerebrospinal fluid) and glycemia was near those existing before the injection of insulin.

Ateneo Parmense, Parma

11: 187-302 (July-Aug.) 1939. Partial Index

*Operation for Calculi of Pelvic Segment of Ureter. R. Brancati.—p. 208.
Syndrome of Nasociliaris Nerve (Charlin's): Cases. F. Carlevaro.—p. 215.
Cirsoid Aneurysm: Critical Study. L. Novara.—p. 283.

Removal of Calculi from Pelvic Segment of Ureter.—Brancati's operation is a modification of Bergmann's ureterolithotomy. It is performed under spinal anesthesia and consists of incision of the abdominal wall exactly on the inguinal canal (on the side of the calculous ureter, the incision being made from the anterior iliac spine to the external edge of the external muscle), opening of the inguinal canal and of the fascia transversalis, section of the epigastric blood vessels (previously ligated), separation of tissues of the pelvic peritoneum so as to have the ureter isolated from the tissues, incision of the ureter, removal of the calculi, suture of the ureter with catgut, and plastic reconstruction of the canal and of the abdominal wall by Bassini's technic (which is used in the reconstruction of the structures after operation for inguinal hernia). When drainage is resorted to the reconstruction of the abdominal wall is performed by Mugnai's technic. The author reports six cases with calculi at either the right or the left pelvic segment of the ureter of either sex, with satisfactory results from the operation.

Prensa Médica Argentina, Buenos Aires

26: 2413-2460 (Dec. 13) 1939. Partial Index

*Blood Transfusion with Large Doses of Arsphenamine in Grave Puerperal Infection. A. Peralta Ramos and A. A. Montes.—p. 2419.
Bilateral Bronchiectases: Insufficient Left Lower Lobectomy. R. Finochietto, A. Rissotto and H. D. Aguilar.—p. 2426.

Blood Transfusion with Arsphenamine in Puerperal Infection.—Peralta Ramos and Montes report satisfactory results from blood transfusion containing large doses of arsphenamine in six cases of grave puerperal infection. Sulfanilamide and immunotransfusion had previously failed in all cases. The technic is as follows: Arsphenamine 1.5 Gm. is dissolved in from 3 to 4 cc. of dextrose solution, which is added to from 200 to 300 cc. of weakly citrated blood (20 cc. of a 2 per cent solution) for further dilution and then administered to the patient by slow transfusion. The ampule which contains the injecting solution is placed at a height of 1.6 meters. The blood is administered by the drip method with a needle 1.8 mm. in diameter (never larger). It is given at a rate of twenty drops a minute so as to instil a dose of 0.01 Gm. of the drug a minute. Lowering of the temperature of the injecting solution during transfusion should be prevented. At the

end of the transfusion (through the same needle) from 50 to 80 cc. of a hypertonic solution of dextrose is administered and an intramuscular injection of 0.1 Gm. of vitamin C and extract of total liver is given. The treatment is repeated on the following day. The treatment was well tolerated and successful. Two treatments were administered in all cases, in spite of the fact that control of the symptoms and of the infection became evident immediately after administration of the first transfusion with arsphenaminized blood.

Revista Médica de Rosario, Rosario de Santa Fe

9D: 1151-1276 (Nov.) 1939. Partial Index

Functional Mastopathy. J. Benzaçon.—p. 1158.
*Treatment of Acute Gonorrheal Urethritis. V. A. Goria.—p. 1198.
*Hyperthyroidism Without Goiter. C. Alvarez.—p. 1209.

Gonococcus Vaccines in Acute Gonorrhea.—Goria used Nicolle and Blaizot's vaccine, which contained between 200,000,000 and 1,500,000,000 gonococci, in seventy-five cases of acute urethritis with or without complications. The vaccine was given every other day or at intervals of two days up to six doses, after which lavages were given for one month if the urethral secretion persisted. Of forty-nine cases of acute urethritis without complications the gonococcus disappeared from the urethral secretion before ten days in thirteen, before twenty days in twenty and after twenty days in sixteen. The secretion stopped before one month in twenty-three cases and after a month in twenty-six cases. In six cases each of acute urethritis with orchiepididymitis or cystitis and in three cases of urethritis with cystitis, clinical and bacteriologic recovery was obtained before two months. In all cases the satisfactory results have lasted from six months to two years after discontinuation of the treatment. Urethral secretion is not present in any of the cases. According to the author gonococcus vaccines, when administered intravenously, give better results than when administered otherwise. It is advisable not to prevent shock from the vaccines, as it is specific and of therapeutic value. Gonococcus vaccines cannot be administered intravenously to ambulatory patients. The patient has to rest in bed for the first few days of administration of the treatment and again on the day on which the vaccine is administered. The contraindications are heart disease, tuberculosis, asthma, cardiorenal diseases and old age.

Hyperthyroidism Without Goiter.—Alvarez studied a large number of cases of hyperthyroidism in the absence of goiter. He calls attention to the frequency of the condition in the presence of various diseases, infections and physiologic phases of life, especially tuberculosis, pure arterial hypertension and the menopause.

Archiv f. exper. Pathologie u. Pharmakologie, Berlin

193: 377-504 (Oct. 24) 1939. Partial Index

Pharmacology of Extrapyramidal System. A. G. Beer.—p. 377.
Microscopic Examination of Brains of Three Cats Without Neocortex. Gertrud Bergner.—p. 408.
*Influence of Ultraviolet Radiation on Epinephrine and Epinephrine-like Bodies. H. Konzett and W. Weis.—p. 440.
Problem of Tachyphylaxis. H.G. Rietschel.—p. 454.
Modification of Quantity of Urine and of Elimination of Minerals by Subcutaneous Injection of Distilled Water: Studies on Rats. H. Vollmer and A. Irmer.—p. 474.
Remarks on Technic of Diuresis Experiment, Explained on Basis of Some Caffeine Tests. H. Vollmer.—p. 483.

Action of Ultraviolet Radiation on Epinephrine.—Konzett and Weis point out that Ewing and his collaborators, in examining the action of ultraviolet radiation on epinephrine, synephrin and ephedrine, observed a contradictory behavior. Whereas epinephrine was found to lose its intensifying action on the blood pressure and the blood sugar, the efficacy of synephrin was found to increase in this respect. Ephedrine responded like epinephrine with a loss. Ewing and his co-authors assumed that this change in action was due to oxidative processes but made no attempt to explain the contradictory results in epinephrine and synephrin. Konzett and Weis assume that the change in the action of synephrin is due to the fact that epinephrine is formed in it under the action of ultraviolet rays. In this paper they report experiments which they carried out to explain this problem. Summarizing their observations they state that epinephrine loses its blood pressure action as the result of ultraviolet irradiation. The fluorescence of the epinephrine solutions decreases in the same measure as does the blood pressure action. Under the influence of ultraviolet irradiation, the epinephrine solutions assume at first a reddish color, then a reddish yellow one and finally they again become colorless. The destruction of epinephrine takes place even under exclusion of oxygen. From synephrin there develops under the influence of ultraviolet rays a body with an intense pressor effect, which on biologic and chemical analysis proved to be epinephrine. The maximal value of epinephrine in the irradiated synephrin solutions amounts to from 8 to 10 per cent of the originally existing synephrin; in the concentrated solutions this maximum is obtained later than in the diluted ones. However, under ultraviolet irradiation epinephrine is not only formed but also destroyed in synephrin solutions. At first its formation predominates, but later with growing exhaustion of the stores of synephrin the destruction of epinephrine predominates. Oxygen is absolutely necessary for the transformation of synephrin into epinephrine.

Klinische Wochenschrift, Berlin

18: 1381-1404 (Oct. 28) 1939. Partial Index

Cardiac Insufficiency and Coronary Insufficiency. E. Edens.—p. 1381.
*Problem of Oxygen Intoxication. H. Becker-Freyseng and H. G. Clamann.—p. 1382.
Agastric Anemia. G. Monasterio.—p. 1385.
Theory of Takata Reaction. Ilse Markolf.—p. 1389.
Cocarboxylase Content of Human Blood. F. Widenhauer.—p. 1392.
Biologic Gordon Reaction. D. Barbieri.—p. 1394.

Oxygen Intoxication.—Becker-Freyseng and Clamann direct attention to the fact that an oversupply of oxygen can be harmful for the animal organism. This observation, which was made by Lavoisier in 1794, was subsequently corroborated by others. Following a brief review of the literature the authors report their own observations in experiments on themselves and on animals. They stayed for sixty-five hours in a chamber the air supply of which contained 90 per cent of oxygen. Rabbits, guinea pigs and mice were subjected to the same conditions, but the authors discuss chiefly the observations made on themselves. During the first twenty-four hours they had no complaints, but changes in the alveolar carbon dioxide tension developed almost immediately after the onset of oxygen inhalation. At the end of twenty-four hours pathologic changes appeared; there were nervous symptoms, such as formication in the fingers and toes and paroxysmal tachycardia. After about sixty hours one of them had attacks of vomiting, which was probably of central origin. Pulmonary symptoms were absent in one case but in the other one symptoms of febrile bronchitis developed and the vital capacity was simultaneously reduced from 4,000 to 2,700 cc., probably as the result of hyperemia of the lung. The observations on healthy human subjects corroborate those made in animal experiments. As in animals, the changes are noticeable in the respiratory tissue of the lung, in the central nervous system and in the blood. After discussing the probable mechanism of the pulmonary and hematic changes, the authors say that the fever, the leukocytosis with deviation to the left, the increased sedimentation speed of the erythrocytes and the febrile increase in the pulse rate are secondary complications of the inflammatory changes in the pulmonary tissue. The question why there were differences in the reactions of the two persons cannot be definitely decided. The authors regard it as more important that both had a decreased vital capacity as the manifestation of inflammatory changes in the lungs and that both had nervous symptoms.

18: 1405-1436 (Nov. 4) 1939. Partial Index

Psychiatric Aspects of New Marriage Law. K. Ernst.—p. 1405.
*Therapy of Intoxications Caused by Soporifics: Question of Action of Intravenous Injection of Large Doses of Metrazol. A. Heinrich.—p. 1410.
Neurohistologic Studies on Pigeons Impaired by Diseptal (Sulfanilamide). E. Beck.—p. 1416.
Coronary Insufficiencies in Extrarenal Azotemias. P. Gömöri and Z. von Gruber.—p. 1417.
Difference in Action Between Stilbestrol and Follicular Hormone. J. J. Duyvené de Wit.—p. 1423.

Metrazol in Intoxications Caused by Soporifics.—In the last eighteen months, forty-two cases of poisoning with soporifics were treated at Heinrich's clinic by intravenous injections of metrazol. Other patients with the same type of poisoning were treated with the customary procedures. All of the forty-two patients who were treated with metrazol had lost consciousness and were entirely unresponsive. The author thinks that although the number of cases treated with metrazol is compara-

tively small, the favorable results which were produced cannot be regarded as accidental. Four patients were not benefited, but three of these were moribund at the time of hospitalization. In comparing the results of metrazol therapy with those of other therapeutic methods, the author found that the mortality from intoxications with soporifics is much lower after treatment with metrazol than with other methods. The majority of the patients responded to a single intravenous injection of from 3 to 5 cc. of a 10 per cent solution of metrazol. This is the dose which the author administers to patients who are unconscious but who react to pinching. The patients who are unresponsive to pinching are given from 8 to 10 cc. of metrazol. If this injection does not awaken the patient, a second injection is made after a short interval (about fifteen minutes) with the same or a slightly larger dose. If signs of convulsion are apparent after the first injection, the second dose should be smaller (5 cc.). If awakening does not follow after a second or even a third injection, treatment should be restricted to measures which support the circulation. However, even the patients who do not respond to two or three injections at short intervals should be given at least two or three injections of large doses of metrazol in the course of the day. With this treatment, awakening may perhaps be obtained in from two to three days. The reviving effect largely depends on the rapidity of the injection; that is, a small dose rapidly injected produces the same result as a large dose that is injected slowly. As in the convulsion therapy with metrazol, the rate of injection is usually 1 cc. a second; but sometimes the injection is made with greater speed. The author watched for complications resulting from this treatment and found that epileptiform attacks may result from excessive doses or from too rapid injection but that they are of no importance, for in these intoxicated persons the convulsions are not as severe or as lasting as they are in persons who are not under the influence of narcotics. The electrocardiogram is not changed by the intravenous injection of large doses of metrazol. The author emphasizes that the treatment is not suited to patients with carbon monoxide poisoning or to patients with morphine intoxications. However, in severe cases of alcohol intoxication the intravenous injection of from 3 to 5 cc. of metrazol proved effective.

Zeitschrift f. d. ges. experimentelle Medizin, Berlin

106: 377-596 (Oct. 10) 1939. Partial Index

Biologic Evaluation of Vitamin A. C. Bomskov.—p. 377.
Investigations on Alcohol Metabolism. E. Dancopoulos.—p. 396.
Course of Daily Blood Sugar Curve During Fasting, During Fluid Intake and During Normal Intake of Food. F. A. Meyer.—p. 409.
Influence of Increased Calcium or Potassium Content of Blood on Electrocardiogram of Healthy Subjects. M. F. von Dungern and H. J. Fundner.—p. 433.
New Method for Evaluation of Sedative Substances. F. E. Koch.—p. 445.
Problem of Inhibitory Action of Spleen on Bone Marrow. P. Jombres.—p. 457.
Fluctuations in Blood Pressure and Fibrinogen. L. Goreczky and G. Berencsi.—p. 495.
*Influence of Cold on Carbohydrate Metabolism. K. Samaras.—p. 510.

Influence of Cold on Carbohydrate Metabolism.—Samaras carried out experiments on the effects of cold on carbohydrate metabolism in male white rats. Several days before the experiments the animals were given a diet with a high carbohydrate content and five hours before they were given 0.5 Gm. of dextrose for each hundred grams of body weight. The dextrose in the form of a 25 per cent aqueous solution was introduced through the stomach tube. This dextrose was given in order to effect a maximal filling of the carbohydrate depots. Twenty-four hours before the cooling experiment the urine of the animals was tested for creatine and only those were used in which the urine was free from creatine. Immediately before the cooling experiment the temperature of the animals was measured. The cooling was effected by placing the rats in water that had a temperature of from 2 to 3 C. (35.6 to 37.4 F.). Care was taken that the head was not under water. The animals remained in the cold water for from five to ten minutes. First there were violent movements with the extremities, then the animals became fatigued and finally they fell into a collapse-like faint. After withdrawal from the water, the temperature was determined at definite intervals. To determine the changes in the glycogen content of liver and muscles, groups of five animals each were killed after intervals of one, two, four, nine, twenty-four and thirty hours. The author found that the sudden reduction of the body temperature to less than 22 C. (71.6 F.) produces a temporary moderate increase in the blood sugar content, an almost complete disappearance of hepatic glycogen and reduction in the muscular glycogen amounting to almost 50 per cent. Finally there is a creatinuria which persists for from two to three days. These are manifestations of the chemical heat regulation, which aims to restore the lost heat as soon as possible. New heat is formed first by the combustion of the preformed stores of carbohydrates in the organism. However, it seems probable that the combustion of sugar plays an important part only immediately after the cooling process. Many factors indicate that the combustion of fat soon takes the place of the sugar combustion and that most of the newly formed heat can be traced to fat combustion.

Nordisk Medicin, Helsingfors

4: 3421-3500 (Nov. 25) 1939. Partial Index

Norsk Magasin for Lægevidenskapen

*Fatal Traumatic Disorders of Brain, Especially Berner's Hemorrhages in Medulla Oblongata and Their Medicolegal Significance. F. Harbitz.—p. 3441.
Case of Death During Treatment with Arsphenamine: "Apoplexie Séreuse." K. Rambøl.—p. 3447.

Traumatic Disorders of Brain and Their Medicolegal Significance.—Harbitz discusses the anatomic manifestations in 165 cases, including sixty-two necropsies which he himself made. Epidural and extradural hemorrhages occurred in twenty-seven cases, with simultaneous hemorrhages in the interior of the brain in only four. Subdural hemorrhages were found in ninety-three cases and were massive in nineteen; intermeningeal or subarachnoid hemorrhages occurred in 112 cases, often with subdural and cortical hemorrhages. Cortical hemorrhages were seen in most of the cases. "Central" hemorrhages were established in the central ganglions in eighteen of his personal cases, and simultaneously or independently in the pons varolii or around the aqueduct of Sylvius in sixteen, in all in about one third of his cases. These hemorrhages were regularly found in connection with fracture of the skull and bleeding in the brain membranes and in the cortex; they were usually inconsiderable, were perivascular and under the ependyma and in most cases were demonstrable only microscopically. Hemorrhages in the medulla oblongata appeared in twenty-three of his personal cases, or about 37 per cent. They were often absent in cases with small lesions of the head and especially when there were simultaneous lesions of the chest and abdomen with internal hemorrhage. Usually they were demonstrable only microscopically and were perivascular, without destruction of nerve tissue, with simultaneous perivascular hemorrhages in other central parts of the brain. There were regularly other marked intracranial changes: large skull fractures, hemorrhages, often considerable, in the brain membranes and especially large cortical hemorrhages and now and then general brain edema. The author assigns little significance from the medicolegal point of view to the inconstant perivascular hemorrhages and asserts that similar hemorrhages have been established in the medulla oblongata in cases of sudden nontraumatic death and have been absent in cases of fatal trauma of the head with symptoms of concussion. He does not regard the base of the fourth ventricle as a place of predilection for such hemorrhages and did not in any of the 165 cases find an isolated massive hemorrhage in the medulla oblongata which could be considered as certainly or very probably of traumatic origin and the cause of death. Five so-called nearly pure cases of concussion of the brain are described, in which, mainly by microscopy, small hemorrhages were established in various parts of the brain, not usually in the medulla oblongata. In his opinion no definite anatomic changes can be regarded as the essential and certain cause of the symptoms of concussion of the brain. He stresses that brain edema when present is an expression of general circulatory disturbance of great importance in explaining the phenomena and eventually the cause of death. He doubts that fatal traumatic disturbances of the brain occur without anatomic changes and maintains that on the whole there is no sharp division from the anatomic point of view between contusion of the brain and concussion.